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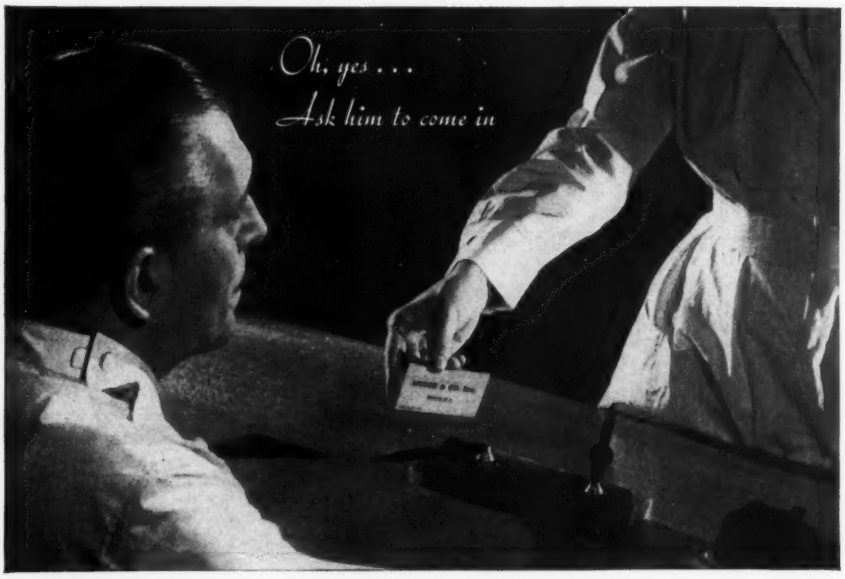

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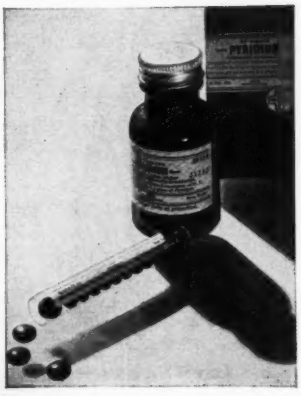

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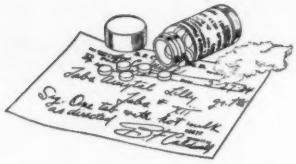

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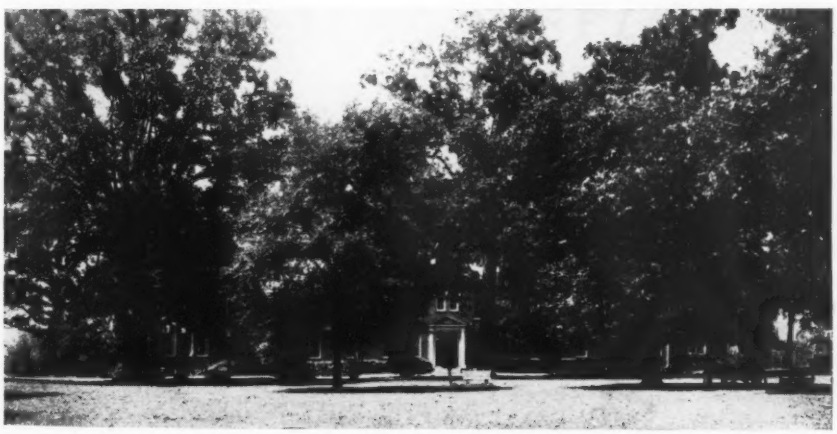

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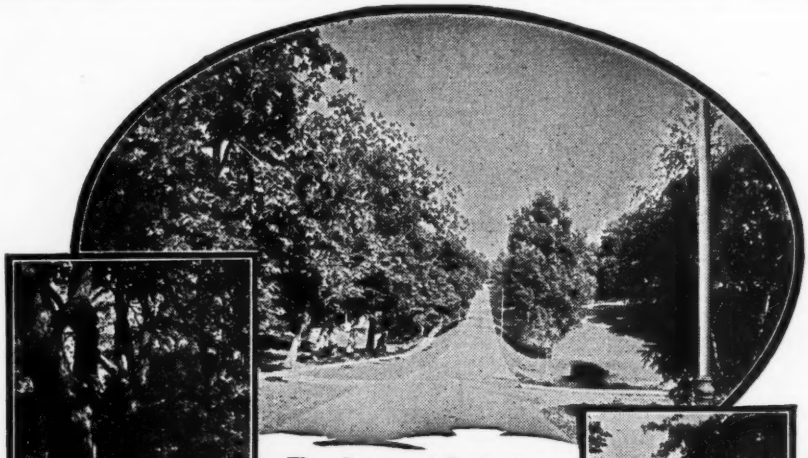

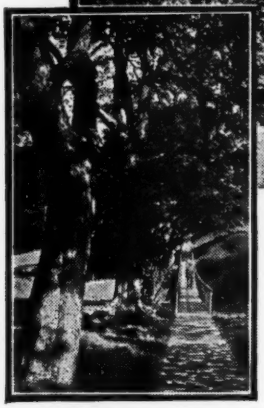

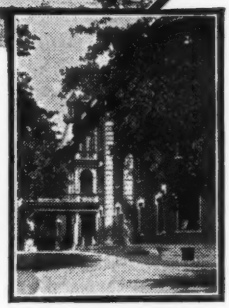

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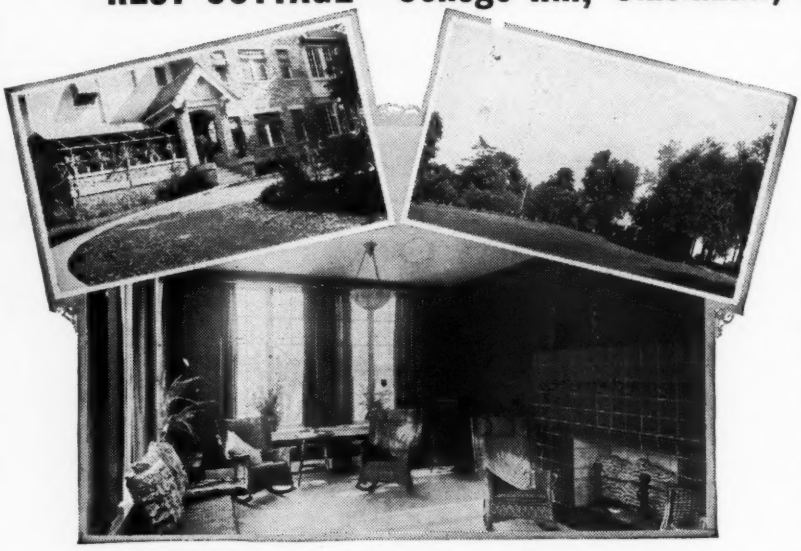

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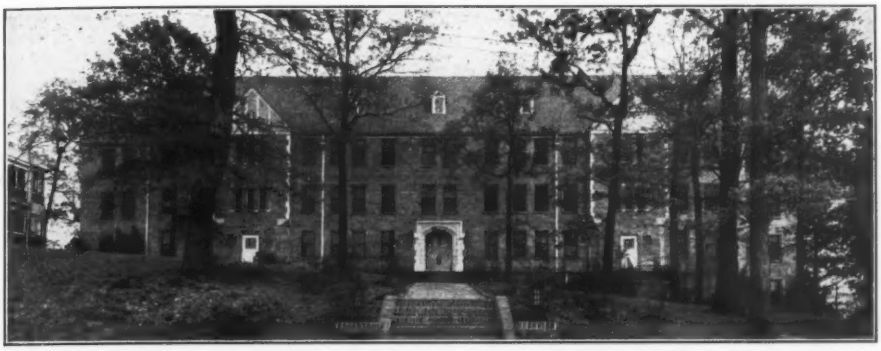

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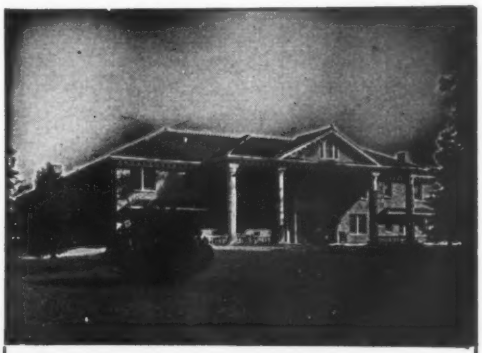

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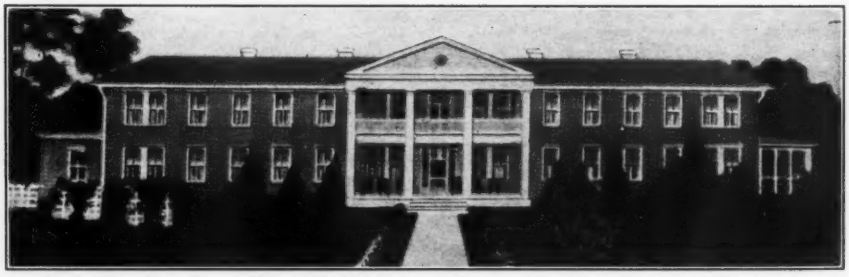

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ROENTGEN RAY STUDIES OF MEDIASTINAL TUMORS*

By CHARLES H. PETERSON, M.D.,
Roanoke, Virginia

In studying the mediastinum, the roentgen ray gives information that cannot be obtained by any other method of examination. The physical examination is helpful, but inconclusive. Laboratory studies, other than the study of biopsy specimens, are helpful only when there are associated changes in the blood. Biopsy specimens can be secured only when there are associated glandular enlargements, and when such specimens can be obtained, it is frequently difficult for the pathologists to arrive at a diagnosis.

The diagnostic value of the roentgen ray does not rest entirely with the fluoroscopic and roentgenographic examinations. A test dose of radiation applied anteriorly and posteriorly to the mediastinum, and the subsequent reaction of the tumor, often help to clarify the diagnosis. Desjardins[1] and Evans and Leucutia[2] differentiate mediastinal tumors by noting their reaction time.

Tumors may arise from the thoracic wall, mediastinal lymph nodes, thyroid, thymus, or, rarely, from the lung. The malignant tumors include the large and small cell lymphosarcomas, those of Hodgkin's disease, leukemic lymphoma, and thymoma. The benign tumors include the connective tissue tumors, dermoid, other cysts, gumma, enlarged tuberculous glands, Pott's abscess, and aneurysm. The last of these, aneurysm of the thoracic aorta, is one that causes many diagnostic difficulties, and this cannot be over-emphasized. R. C. Pendergrass[3] and others[4] have pointed out that aneurysms offer quite a problem; being of tumor density, occurring at various levels, and frequently showing no expansile pulsation. A Pott's abscess may likewise be confusing, although the focus can usually be demonstrated. Tumors of the thymus and thyroid can usually be identified by their respective anatomical origins, although a large tumor may be so extensive that this point is of little help.[5]

Therapy in benign mediastinal tumors is usually a surgical problem and the roentgenologist is concerned only with diagnosis and follow-up examinations. He is usually responsible for the handling of malignant tumors, however, and frequently a test dose of radiation is necessary. The dose should be accurately measured and cross-fired into the mediastinum from at least two portals. Nine hundred r are given to the anterior mediastinal area and 300 r posteriorly. Two hundred K.V.P. is preferred to the lower voltages and is given at 50 cm. and 5 ma. with filtration of 0.5 cm. of copper and 1 mm. of aluminum. This radiation is given in small divided doses with treatments every other day. Some tumors will not require this amount, but others will respond more slowly and additional radiation must be given to cause their disappearance. Radiation will cause a malignant tumor to disappear in a large proportion of cases. If the tumor is due to a primary carcinoma of the thymus, a large round cell sarcoma, or to fibrosarcoma, there will be a diminution in size, if not an actual disappearance.

In Hodgkin's disease, or a similar type of condition where the tumor is associated with enlarged lymph nodes in other portions of the body, biopsy studies can be made and the treatment more intelligently given, but in many cases there are no such associated glandular enlargements, the changes being confined to the mediastinum. These patients are frequently ill, some being almost *in extremis*. Something has to be done and the radiologist is usually the one who is called upon. Intelligently given roentgen therapy, even in the most extreme cases, should be applied without hesitation. The results are usu-

*Read in Section on Radiology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

ally striking and a test dose of radiation has little, if any, ill effects, although the tumor may not respond.

The radiologists have been criticised by the pathologists for irradiating these cases blindly. Haagensen,[6] reporting nine cases in which autopsies were obtained, states that the roentgenologists are frequently guilty of premature reports of the reaction of mediastinal tumors to radiation, which reports contain no information as to the pathologic nature of the tumor and the end-result of the treatment. It is conceded that a more scientific procedure would be desirable, but in many cases biopsy material cannot be obtained. In other cases it is advisable to give radiation before the tissue can be reported upon. In a third class of cases the biopsy is of little, if any, value. It is surprising to the radiologist to see a series of mediastinal tumors reported in the literature, many of which were diagnosed before death, in which no radiation was given at all. It would seem as gross an error to report an autopsy on a case of mediastinal tumor in which no radiation had been given as to irradiate blindly without knowing exactly the nature of the underlying tumor. A few years ago, before roentgen ray diagnosis and therapy had progressed to its present stage, many deaths were reported from untreated tumors. In 1931 thirty-two cases were reported in which no roentgen ray or radium therapy was applied. Eight verified cases with eight autopsies were reported in one group, none of these receiving roentgen ray or radium therapy.[7]

The roentgenologist must work with the clinical pathologist in addition to correlating all clinical facts. If a definite diagnosis cannot be made, or if tissue cannot be obtained for study, a test dose of radiation is justifiable.

In each case to be described, stereoscopic antero-posterior films were made in addition to lateral views and fluoroscopic observations. Oblique films were helpful in some cases, but were not taken routinely.

The first two cases to be described illustrate the difficulty of differentiating between a true tumor and an aneurysm.

Case 1.—A white man, aged 59, was first seen in May, 1933, complaining of chronic cough, pain in the right side of the chest and loss of weight. These symptoms had been coming on for six or eight months. The Wassermann and Kahn were four plus, other blood examinations being negative. A roentgen examination of the chest showed a large non-pulsating nodular tumor occupying the posterior mediastinum and impinging upon the retrocardiac space (*Fig. 1*). Although the Wassermann and Kahn were four plus, it was decided to give a test dose of radiation, and 980 r were given anteriorly and 330 r posteriorly. There was no decrease in size of the enlargement. The patient is still living. A test dose of radiation was given because the roentgen ray examination and clinical findings were atypical of aneurysm

Case 2.—A white man, aged 61, six months prior to examination started having intermittent attacks of severe pain, anginal in character, requiring large doses of morphia. There was a fullness of the neck, but no generalized glandular enlargement. The Wassermann

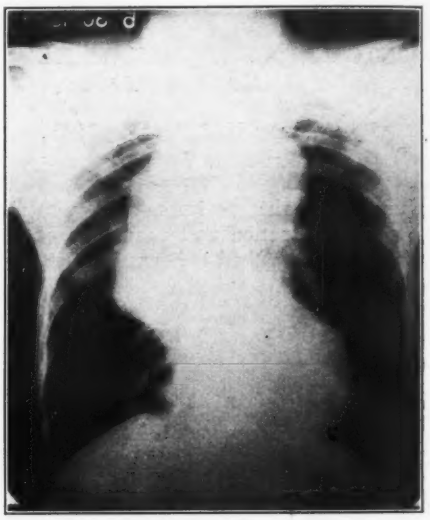

Fig. 1
Large non-pulsating aneurysm.

Fig. 2
Non-pulsating mass projecting from right mediastinum

Fig. 3
Enlargement from a Pott's abscess.

and Kahn were negative. The patient was referred for a roentgen study of the chest (*Fig. 2*). There was a cardiac outline suggestive of lues. The posterior mediastinum was completely obliterated by a non pulsating mass that projected also into the right root region. The mass could not be projected away from the thoracic aorta, but in view of absence of pulsation a test dose of radiation was advised. The patient was not treated at this time. Two weeks later there had been a slight increase in the size of the mass and a test dose of radiation was urged even more strongly. This was given as in *Case 1* without decrease in the size of the enlargement. There have been no anginal attacks since the radiation. The patient is able to carry on his business activities. The enlargement is thought due to aneurysm.

Case 3.—In a colored girl, aged 14, the plate of the chest demonstrates the enlargement that may be obtained from a Pott's abscess (*Fig. 3*). This particular abscess is between the domes of the diaphragm, but it can occur at any level. Examination of the spine will usually reveal the primary focus.

Case 4.—A white woman, aged 37, was first seen in March, 1932, complaining of cough, weakness, difficulty in breathing, a sensation of a mass in the right chest, and weight loss of 20 pounds. There was generalized glandular enlargement with a large mass of glands in the left groin. The Wassermann, Kahn and other blood examinations were negative. The temperature was elevated, reaching to 101°. A superficial lymph node was removed and a diagnosis of Hodgkin's disease returned by the pathologist. Roentgen ray examination of the chest showed a mediastinal mass extending laterally from the superior portion of the right mediastinum (*Fig. 4*). There was some infiltration of the right base, which was also attributed to the Hodgkin's. Seven hundred r were given over the anterior mediastinum and 550 r posteriorly, in addition to localized radiation of the left inguinal region. These treatments covered a period from March until July, being given in small divided doses. In April the mediastinal tumor had decreased materially in size. In May it had practically disappeared, but the changes in the right base were more prominent. In October the tumor had entirely disappeared (*Fig. 5*). Twenty months have

Fig. 4
Case 4 before treatment.

Fig. 5
Case 4 after treatment.

Fig. 6
Case 6 before treatment.

elapsed since the mediastinal tumor was first treated and there has been no recurrence, although it has been necessary to give additional radiation to the inguinal region.

Case 5.—A white woman, aged 33, in August, 1931, noticed a fairly large lymph node above the outer portion of the right clavicle. This node and a smaller one adjacent to it became steadily larger. In September a roentgen examination of the chest showed a small mass projecting to the right of the mediastinum. The supraclavicular lymph nodes were removed for biopsy and sections were sent to several prominent pathologists, who could not agree on a diagnosis. The diagnoses included tuberculosis, Hodgkin's disease, and lymphosarcoma. In October, 1931, 600 r were given anteriorly and posteriorly to the mediastinum, in addition to lower voltage radiation to the right side of the neck. The mediastinal enlargement disappeared completely. There was a slight recurrence in May, 1932, at which time additional radiation was given. She has had no radiation since that time except to an enlarged node in the right axilla. It has been two years since the first radiation was given to the mediastinum. The roentgen ray examination and clinical findings would indicate that this is an early case of Hodgkin's disease. It is difficult to make a definite diagnosis, however, because the biopsy sections are indefinite. This case shows that a definite diagnosis is difficult even when biopsy is done.

Case 6.—A white man, aged 49, was referred for roentgen study of the chest, complaining of a swelling of the neck which was gradually becoming worse and producing slight respiratory embarrassment. The Wassermann, Kahn and other blood examinations were negative. There was no generalized glandular enlargement, although one small node could be felt immediately above the left clavicle. This was not removed for biopsy. Roentgen examination on September 1, 1933, showed an irregular enlargement projecting from the left margin of the posterior mediastinum (*Fig. 6*). There was no pulsation. Nine hundred r were given anteriorly and 500 r posteriorly. An examination on October 19 showed a complete disappearance of the tumor (*Fig. 7*). The patient's symptoms are entirely relieved and he has resumed his work as a day laborer. It is unfortunate that the node above the left clavicle was not removed for biopsy, since it completely disappeared after the initial dose of radiation.

Case 7.—In a white man, aged 29, symptoms started in March, 1931, with slight cough and a pain in the

Fig. 7
Case 6 after treatment.

Fig. 8
Case 7 before treatment.

Fig. 9
Case 7 after treatment.

base of the left chest. Dyspnea was noticed three months later and became gradually worse. He was seen on November 19 by Dr. G. B. Lawson, who referred him for roentgen ray examination of the chest with a clinical diagnosis of mediastinal tumor. At this time the patient showed signs of extreme dyspnea and orthopnea, associated with cyanosis. The face and neck were swollen. There was a distention of the superficial veins of the chest, upper abdomen and arms. A network of distended veins was present in the epigastric region. There was no generalized glandular enlargement. The Wassermann, Kahn and other blood examinations were negative. Roentgen ray examination of the chest showed a large, non-pulsating, retrosternal mass in the superior mediastinum extending about equally to the right and left of the mid-line (*Fig. 8*). The mass occupied the anterior mediastinum and projected downward over the heart. The retrocardiac space was partially obliterated, secondary to pressure from the tumor. A diagnosis of thymoma was made and radiation was advised. This was started in November, 1931, and 650 r were given anteriorly and 200 r posteriorly. Two weeks after the radiation was started the tumor was smaller. The patient's symptoms had practically disappeared. Four weeks after radiation was started the mediastinal mass had completely disappeared. An examination two years later shows no evidence of return of the tumor (*Fig. 9*). The patient, a day laborer, resumed his work four weeks after treatment was started and since that time has been in perfect health, gaining over 40 pounds in weight. This is a case of malignant tumor of the thymus. In such a case biopsy material cannot be obtained, the patient is ill and requires immediate treatment. The radiation need not be intense, since these tumors usually respond promptly.

SUMMARY

Test doses of radiation should be given to all non-pulsating tumors of the mediastinum. Aneurysm is the chief cause of difficulty in diagnosis, since all aneurysms do not pulsate. Radiation is advisable even in the absence of biopsy material. Reports describing the management of mediastinal tumors are helpful, although a definite pathological diagnosis has not been established.

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DISCUSSION (*Abstract*)

Dr. E. M. McPeak, Washington, D. C.—Mediastinal tumors constitute a most interesting group and one in which a diagnosis can usually be established only by means of the roentgen ray.

The important point is to determine whether the lesion is a benign or a malignant one. This can be done in the majority of instances by a careful fluoroscopic examination and roentgenograms made in the anterior and lateral planes. There are, however, a certain number of cases, especially the non-pulsating aneurysms, which defy all direct methods of differential diagnosis. It is in this group that the therapeutic test of roentgen therapy is of utmost importance. This consists of irradiating the mediastinum and re-examining the patient after an interval of a week or ten days. If the lesion is a malignant one, especially one of the malignant lymphoma group, there will be either a definite diminution in the size or complete disappearance of the tumor mass. This test has received universal recognition as a most important and accurate diagnostic procedure and should be instituted in every case. There are no contraindications to this procedure.

The benign mediastinal tumors, if any therapy is indicated, are usually surgical problems and therefore do not primarily interest the radiologist from a therapeutic angle, although I have seen several substernal thyroids relieved of their pressure symptoms following irradiation.

The treatment of the malignant group, however, is entirely a problem for the radiologist. The accepted method of treatment at the present time is to administer fractional doses of roentgen therapy, either daily or every other day, over the mediastinum until the lesion has entirely disappeared or until an erythema dose has been given over the anterior and posterior thorax. The results are very gratifying, many cases are afforded normal life for a number of years, and some are permanently cured.

Dr. Peterson (closing).—There are two points that I should like to stress. First is the importance of roent-

gen ray examination of the chest in all cases of generalized glandular enlargement. The second is the importance of making a chest examination in a'l cases of brain tumor. The intracranial condition may be secondary to a mediastinal tumor and recognition of the latter condition may materially change the type of treatment indicated.

MULTIPLE POLYPS OF THE COLON*

By FRED W. RANKIN, M.D.,
Lexington, Kentucky

Polyps of the colon, be they only two or three in number, or so diffuse as to cover practically the entire mucous membrane of the large bowel, are mainly important because of, first, their tendency to undergo malignant degeneration, and second, their tendency to cause obstruction. This obstruction may be due either to encroachment on the lumen by the rapid growth and degeneration of the polyp, or as is frequently the case, to intussusception, secondary to the bowel's effort to extrude an intra-luminary growth by peristalsis.

All pathological types of benign tumors, fibromas, lipomas, myomas, adenomas, *et cetera,* are found in the large bowel, and being pedunculated, may be termed polyps. The adenomas are by far the most common of these tumors and occur in any portion of the gastro-intestinal tract, singularly or in large numbers, showing a marked predilection for the large bowel, particularly its terminal portion.

When these adenomas occur in great numbers, it has been customary to designate them under the term of "polyposis." Erdman and Morris suggested, some years ago, that "diffuse adenomatosis" would be a better term, and Broders offered "polypoidosis" as a more descriptive pathological term indicating that the entire inner surface of the large bowel, from the anus to the cecum, contains convoluted polyp-like elevations. This is the pathological condition which was described by Menetrier years ago as *"polyp-adenomas en nappe."*

There are two varieties of multiple adenomas or polyps of the large bowel: one, a true neoplasm of congenital origin, and the other, a pseudo variety secondary to some chronic inflammatory condition such as chronic ulcerative colitis. Bargen has shown that 10 per cent of cases of chronic ulcerative colitis develop multiple polyps eventually, and that the ratio of these polyps to other so-called multiple polyps is as four to one. The congenital type of adenomas usually occurs in families and is known to undergo malignant degeneration in approximately one-half the cases. The highest incidence of this condition is usually noted among children and young adults. The ages vary materially, and I have seen a case in a patient as old as 75 years. I have operated upon two cases in the same family, and have observed two other families where the association was established. It seems to be found more commonly in males than in females.

PATHOLOGY

These tumors vary in size from small raised areas of the mucous membrane, a few millimeters in diameter, to pedunculated tumors several centimeters in diameter. They may also be sessile or both varieties may be present in a single case. The involvement of the mucous membrane may be limited to one or more segments of the bowel, or may include that of the entire colon. The microscopic appearance of these polyps is characteristic and uniform.

I think the most important pathological consideration is the transformation of these polyps into malignancies. That this occurs, seems incontrovertibly established by a number of observers, but the credit of being the first to bring evidence of the malignant transformation belongs to Bardenheuer, who was followed shortly by Quenu and Landel. Hauser, Wechselmann, Schmeiden and Westhues and FitzGibbon and Rankin have all reported series of cases bearing out the contention that there is a malignant transformation from benignancy demonstrable in many of these polyps. In reviewing the histopathologic characteristics of 13 cases of adenomatosis of the large bowel, FitzGibbon and I were able to demonstrate clearly that polyps were not all of one type, but that they were divided into three distinct groups, varying grossly as well as microscopically.

In the polyps of *Group I,* the epithelial elements are practically normal, and the tumefactions are small, rough nodules, seen on the mucous membrane of the bowel, varying in size from a pin-point to a mass 1 or 2 cm. in diameter on cross section. The very striking frequency of occurrence of this type of polyp in colons examined in the mortuary leads one to wonder at the probable normal incidence of this

*Read in Section on Surgery, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

Fig. 1
A resected specimen of colon and rectum showing diffuse adenomatosis. Two of the large polyps had already undergone malignant degeneration.

type of tumor in the large bowel in otherwise normal persons. It is conceivable, but highly improbable, that they may become cancerous, and I strongly question whether there is much evidence to support such a view.

The polyps of *Group II* are easily distinguishable from those of *Group I* by reason of their structural changes, and I believe that those of *Group II* are direct precursors of definite malignant changes. The epithelium in this group fails to differentiate into normal mucosa, the cells are elongated and line the tubules in a single layer, or may be compressed together laterally, and project into the adjacent connective tissue or into the lumen of the tubule. There is a change in the underlying connective tissue, which, because of the tug of the peristalsis of the bowel, begins to be pulled into the polyp and thus forms a stalk. The rapidity of growth of these polyps is unquestionably in direct proportion to this activity. The polyps become large, polypoid, pedunculated masses, which project into the lumen of the bowel, and for this very reason are more favorable of prognosis than polyps of *Group III*, which are in a more advanced stage and are represented by completely undifferentiated epithelium, which out-paces the connective tissue to such an extent that there is no pedicle, but the resulting malignant metamorphosis produces a deep-seated, infiltrating type of carcinoma, frequently small, sessile, penetrating and growing toward the peritoneal coat of the bowel, rather than intraluminarily. For this reason, as well as on account of the activity of the growth, carcinomas which develop from this group of polyps are less favorable of prognosis, because of the likelihood of rapid lymphatic involvement and consequent metastatic deposit.

This transformation into malignancy by polyps constitutes a fascinating hypothesis, but it is impossible to prove, or even suppose, that all carcinomas of the colon develop thus. However, I am confident that a great many cancers are produced in just this manner, without knowing the initiating force which stimulates hyperplasia of certain elements of the intestinal wall into an activity which, by its advance, becomes malignant. I believe that it is a reasonable conclusion that a great many carcinomas of this region, perhaps more than we suspect, are thus etiologically explainable.

The commonest sites of polyps and carcinomas of the lower end of the gastro-intestinal tract are the sigmoid and rectum. The ratio of eight cancers of the sigmoid and rectum to one in the rest of the colon is maintained in the incidence of the polyps.

SYMPTOMATOLOGY

The amount of involvement of the gastro-intestinal tract, together with the amount of obstruction or ulceration caused by it, determines the clinical course of this condition. Obstruction occasionally occurs as the direct result of one of three processes: (1) occlusion of the lumen of the bowel by the growth of the polyps; (2) malignant degeneration in the polyps; (3) intussusception.

Intussusception apparently occurs in a high percentage of these cases, and it is not essential that a tumor be pedunculated to cause it. Large sessile polyps have frequently been observed to produce this type of obstruction.

It is the group known as multiple polyposis with which we are most concerned, and the symptoms of this clinical type are mainly diar-

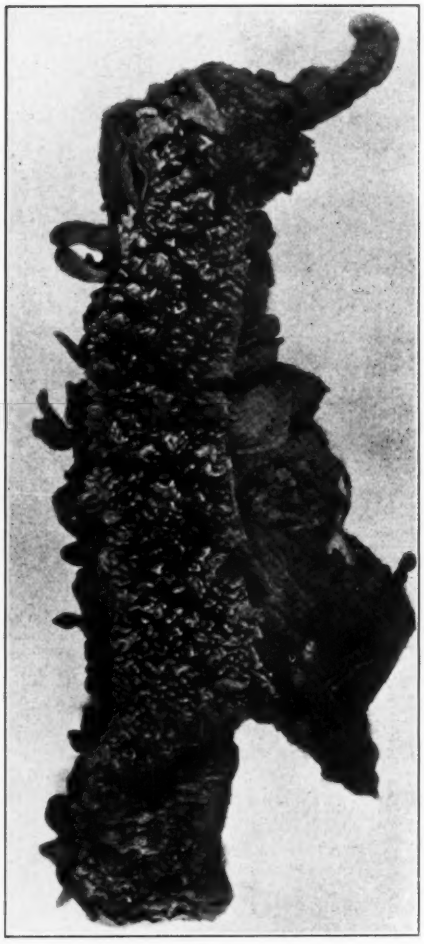

Fig. 2
Very diffuse adenomatosis of the entire colon. This is the type which the term "polypoidosis" describes best.

rhea, with passage of blood and mucus in the stools, and pain occasionally accompanied by nausea and vomiting. Weakness and loss of weight as secondary symptoms are quite often present. The diarrhea varies in intensity, and here as in cancer of the colon, it is difficult sometimes to evaluate a history unless one goes into it most meticulously. A mild form of diarrhea, with two or three loose stools a day, continuing over a period of time, may indicate a diffuse lesion of the large bowel, but on the other hand occasionally 20 or 30 watery ones in a day may be reported. A polypoid tumor may even extrude from the rectum if the lesion is rather diffuse and the lower segment of the bowel badly involved.

Erdman and Morris have pointed out that there is a distinct difference in the picture of the youthful type as opposed to the adult or acquired group. Pathologically, there is little difference except in the amount of involvement of the mucous membrane of the colon. The adolescent type shows the most diffuse involvement, as well as the severest of symptoms. Occasionally it is unquestionably true that the symptoms in young people may occur out of a clear sky without warning and examination show the colon involved in its entirety. Such attacks are usually ushered in by blood in the stools, with definite abdominal discomfort and intermittent cramp-like pains, which persist over a period of days or weeks, and recur again after a short interval of time.

Rectal symptoms of tenesmus and hemorrhage are commonest, since the disease usually starts low in the left half of the colon, the tenesmus being in direct proportion to the closeness of the lesions to the anal sphincter muscle. While pain is not a striking symptom, there is a vague discomfort during attacks and occasionally considerable pain over definite portions of the entire colon. Secondary anemia usually is present as a characteristic blood picture.

It is customary for young adults to suffer many attacks of so-called "summer diarrhea" or "spastic colitis" or "mucous colitis," and to be treated for a great many intestinal complaints before the diagnosis is arrived at. A strong suspicion of polyposis should be entertained in a young individual with a history of intermittent, recurrent, progressively more severe attacks of bloody diarrhea. Digital, proctoscopic, and radiologic examinations confirm the diagnosis.

In a clean bowel, if the polyps are low, they cannot only be felt by digital examination, but can be observed under the proctoscope. Roentgenograms, particularly those made by the "combined double contrast" method of Fischer, accurately interpret their presence and distribution. The method of application of this technic as modified by Webber is as follows: the bowel is first thoroughly cleansed; the patient is given an opaque enema, which is immediately evacuated as completely as possible; the colon is insufflated with air under roentgenoscopic control until the cecum has been filled, whereupon stereoroentgenograms are made. The lacy net-

work of shadows produced is said to be pathognomic of generalized polyposis.

TREATMENT

Surgical extirpation of the entire large bowel, or several segments of it, for multiple adenomatosis, is a formidable procedure not to be undertaken lightly. In addition, frequently the associated conditions must be treated together with such etiologic factors as chronic ulcerative colitis or tuberculosis. Where one undertakes surgical measures for this lesion, usually there is present a complicating anemia, or some other debilitating condition. Large polyps situated in one segment, and it is usually the sigmoid, may be removed by transperitoneal colostomy satisfactorily with a low mortality. The resection of a segment of bowel for isolated adenomatosis likewise may be attempted without grave risk, but the formidable procedure of total colectomy should be given grave consideration before it is undertaken. Palliative measures are not to be considered seriously in the treatment of multiple adenomatosis because of the serious danger of malignant transformation.

The extirpation of the colon for diffuse lesions may be undertaken with two objectives in mind. If the adenomata are largely confined to the colon proper, and there are only a few scattered tumors in the rectum, one considers sacrifice of the large bowel and the transplantation of the ileum into the rectum, thus saving the sphincteric mechanism. Small polyps which are present in the rectum may be destroyed by fulguration. I have had one such case in which the result up to date is entirely satisfactory. There has been no evidence that the rectum is developing polyposis again.

Where the rectum is involved in such a way as to preclude saving it, a three-stage procedure is most desirable. This procedure consists of first, ileostomy; second, subtotal colectomy down to or near the recto-sigmoid juncture; and third, a combined abdomino-perineal resection of the recto-sigmoid and rectum. These three stages evolve a rather prolonged procedure, but I believe increase the safety of the maneuver. A single-barrel ileostomy is established in the right lower quadrant through a McBurney type of incision. Once this ileostomy is adequately working, and the loss of fluids from it has been compensated for and at the same time the terminal ileum has taken on some of the function of the large bowel, and the fecal current becomes semi-solid, one may consider the second stage. I believe it is perfectly feasible to wait weeks, and even months, between the first and second stage if it is not felt that malignancy has already developed. The rapid loss of body fluids following the establishment of the ileostomy necessitates a considerable amount of rehabilitation before the individual is able to stand an extirpation of the colon without grave danger.

The second stage consists in the removal of the colon down to or near to the recto-sigmoid juncture. This is accomplished through a long left rectus incision. In the last few cases, it has been my custom to save the omentum in removing the colon. This, I find, simplifies the operative procedure and reduces the postoperative reaction. It is essential in this stage adequately to peritonealize the raw surfaces, for second only to the danger of postoperative peritonitis is the fear of small bowel obstruction by adhesion to some uncovered raw surface. Again a period of time is allowed to elapse between the subtotal colectomy and the combined abdomino-perineal resection of the rectum. I prefer to do the combined abdomino-perineal resection of the rectum rather than to carry the second stage further and ligate the inferior mesenteric vessels and sacrifice the blood supply to the rectum. This results, frequently, in necrosis and abscess formation, retroperineally.

At a meeting of the American Surgical Association in San Francisco in 1931, I reported six cases of total colectomy which had been accomplished without mortality. The operations were not all done for true polyposis: only three of them fell into this group. One of the three was an uncomplicated case of adenomatosis, and two were cases of diffuse polyposis, in which malignant degeneration in one or more polyps had already taken place. One other case was for pseudo polyposis secondary to ulcerative colitis and the other two were done in complicated cases of ulcerative colitis. The operations were all performed in three stages, and I think the successful outcome argues strongly for the multiple stage procedure. Strangely enough, the cases of chronic ulcerative colitis which were associated with considerable infection made as uncomplicated recovery as did the others. Their acquired immunity must have undoubtedly played an important part in avoiding mortality.

DISCUSSION (*Abstract*)

Dr. A. Stephens Graham, Richmond, Va.—For several years I was associated with Dr. Rankin in the care of many such patients as he has discussed in his paper. During this period and since, in my own practice, I have been impressed with the considerable number of

cases in which malignant degeneration had apparently occurred in one or more benign polyps. In a few instances the involved polyps were known to have existed in the innocent state for many years prior to such a change. This brings us to a consideration of the probable frequency with which early malignant changes in these nominally benign structures are overlooked because of failure on the part of many physicians to recognize the possibility of such an occurrence. Out of fifteen cases of carcinoma of the large bowel which I have treated surgically since the first of this year five have, in my opinion, definitely developed in benign polypoid growths. In only one instance was there a generalized polyposis; in two instances there were additional benign polyps limited to the vicinity of the cancer. One of these patients consulted his physician because of blood streaked stools and on examination there was found a small pedunculated polyp near the rectosigmoid. Because there was no evidence of ulceration it was considered benign and the patient was instructed to take enemas of mineral oil and advised to return in six months for observation. A biopsy taken less than a week later, however, revealed an adenocarcinoma, graded three, which on close examination following resection of the rectum was found to be limited to the outer half of the growth. Several small polyps found in the resected bowel proved to be benign. There was no glandular involvement. Recovery was uneventful and the prognosis is very good. Another of these patients came to surgery late as an emergency case because of complete obstruction produced by a carcinoma situated at the rectosigmoid. For several months prior to this she suffered from a profuse bloody diarrhea which was diagnosed dysentery, although there had been made no digital, proctoscopic nor roentgenographic examination. It was necessary to establish a permanent ileostomy in the terminal ileum because of innumerable polyps situated in the cecum and transverse colons. Recovery was satisfactory, but total colectomy is not contemplated in view of the advanced nature of the malignancy which apparently began in one of the multiple polyps.

Dr. Rankin spoke of performing total colectomy for generalized polyposis. I wish to emphasize the entirely satisfactory manner in which these patients tolerate permanent ileostomy which is established prior to resection of the colon. I have a very clear recollection of three of his patients who illustrate this point. One of them, a young man, after having gained over fifty pounds in weight following colectomy returned to college, participated in numerous athletic events, and when heard from last was contemplating matrimony. Another one, a traveling salesman who covers an extensive territory by automobile, is an indefatigable worker and gives every appearance of enjoying excellent health. A third patient, who graduated from college as a mechanical engineer, is now wielding a pick-axe in a copper mine from eight to ten hours each day. They claim to be in no way handicapped by the ileostomy over which they have a remarkable degree of control. Ileosigmoidostomy as a substitute for permanent ileostomy is very often unsatisfactory since the rectum seldom adequately accommodates itself to the presence of liquid feces.

In concluding I wish to express the belief that the rate of operability in carcinoma of the large bowel will be materially enhanced when the following propositions are quite generally accepted by the medical profession:

(1) That a finding of one or more polyps on digital or proctoscopic examination suggests the possibility of a generalized polyposis which can be determined only by roentgenoscopic examination.

(2) Malignant changes may already have taken place in one or more polyps, although grossly such evidence is wanting.

(3) Although benign at the time of examination, polyps are potentially malignant and in every instance should be fulgurated, excised individually, or, in case of generalized polyposis, be removed by means of a total colectomy.

INTRATHORACIC CHANGES IN TULAREMIA*

By ALFRED BLUMBERG, M.D.,
and
R. L. RUSSELL, M.D.,
Oteen, North Carolina

The commonly accepted view that tularemia, whether manifesting itself as the glandular type or the typhoid type, pursues a course remarkably free from complications, is probably based on the clinical observations of cases in which the diagnosis was clear, the ultimate prognosis good and complications few. Principally in cases of doubtful diagnosis, further study leads to the discovery that the usual course of tularemia may be seriously modified by changes in the thorax which, in the absence of a positive laboratory test, may be very mystifying and lead to an erroneous diagnosis, especially of tuberculosis, pleurisy with effusion or other pulmonary diseases.

It is a general opinion that the so-called idiopathic pleurisy is due to tuberculosis even though the tubercle bacillus cannot be demonstrated. Lately, however, this view has been questioned. Repeated objections have been raised, based upon good clinical evidence, which rules out the existence of tuberculous process after patients have recovered from these idiopathic pleurisies. Our inability to find the etiologic factor responsible for the pleurisy does not prove that the condition is not of bacterial origin. Neither does it prove that the tubercle bacillus alone is responsible for the existing dis-

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*Veterans' Administration Facility.

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ease. Recent experiences have shown convincingly that the *Bacillus tularense* may play a part in both pleural and pulmonary disease with little hope of isolating and identifying the organisms by simple laboratory means. This organism was not suspected to be the offender until recently, when repeated postmortem findings indicated the existence of pulmonary lesions as a part of tularemic complications. Clinically, there may have been evidence of pulmonary disease.

It has come to the attention of physicians, as a result of postmortem findings, that patients who have complaints referring to either lung or pleura with a definite history of tularemia, usually show pathologic changes in the lung or pleura as a result of the activity of the invading organisms. There is considerable literature available to show that intrathoracic disease may be caused by this micröorganism. Conditions such as pleural effusion, bronchopneumonia, bronchitis and pulmonary abscess are caused by the bacillus, but so far no positive evidence exists to the effect that these conditions are ever primary. In a personal communication Dr. Francis emphasized this point. He said:

"The pneumonic condition in all * * * cases is secondary, never primary. There is no such thing as a primary pneumonic form of tularemia, such as there is in plague * * * in tularemia the pneumonia is secondary to a portal of entry on the skin, usually an ulcer from skinning rabbits, accompanied by enlargement of the regional lymph node; the point is that when a patient has pneumonia it behooves the doctor to find out why he has a bandage on his finger."

Unfortunately this is not always possible. Francis and Callender call attention to the fact that the organism may gain entrance to the body producing symptoms of infection without either a local lesion or external adenopathy. Quite recently we had a patient whose pulmonary condition, after exhaustive study, could not be explained and we finally resorted to the agglutination test to find out whether any evidence of tularemia existed. His blood serum gave a highly positive agglutination test, and when questioned whether he ever had a skin lesion he answered in the negative. He admitted that he had partaken of meals of cooked rabbit, but he had not skinned any rabbits for the previous two years. He denied any swelling that would lead one to believe that he had had an abscess or lymphadenitis in the previous few years. Recent literature, however, indicates that there are other modes of infection and even improperly cooked, infected rabbit meat may give rise to tularemia (Crawford).

During the last few months we had occasion to recognize pleuropulmonic lesions apparently caused by the *Bacillus tularense* in four different instances.

Case 1.—S. C. Maxey, aged 41, white, was admitted to the Veterans' Hospital, Columbia, South Carolina, on January 7, 1933, with a diagnosis of tularemia. The patient had dressed a rabbit on November 25, 1932, and at the time he had two cuts on his fingers, one on each hand. On November 27, he had chilliness and on November 28 he noticed that the cuts were infected. His temperature rose to 104° F. (His mother-in-law cut up the rabbit and she also developed tularemia) This patient had bilateral axillary adenitis on admission. One side drained spontaneously and the other was incised. His temperature was 37.2° C. on admission and returned to normal on the eighth day following admission, remaining normal until the day of discharge, February 27, 1933. The agglutination test was done at Washington, D. C., and the findings were positive.

This patient was readmitted to the same hospital on March 20, 1933, with a diagnosis of severe tachycardia with cardiac decompensation. This diagnosis was made by a consultant in cardiac diseases. Dr. Fred C. Locke was asked to examine the man's chest on March 23, 1933. The patient had all the clinical findings of pleurisy with effusion and the apex of the heart was found in the fifth interspace, almost 4 cm. outside of the mid-clavicular line, left. The roentgenogram was also interpreted by him as effusion. The patient stated at that time that, while he had some slight cough before his discharge from the hospital, the cough had been worse from about March 13, 1933, and on March 14 he had fairly sharp pain in the right lower chest and his temperature rose to 100.2° F. On March 16 and 17 it reached 101° F. No blood count had been made on this admission. Since this effusion had not come on during an acute pulmonary condition, that is, pneumonia or influenza, it was important to search for the cause. The clinical course, while the fluid was forming, did not conform to the clinical course of idiopathic pleurisy (tuberculous pleurisy) and knowing that the man had had tularemia, suspicion was aroused that this might be the cause of the pleurisy with effusion. Part of the fluid that was withdrawn was sent to Oteen and a sample was sent to Dr. Francis after Oteen reported a positive agglutination test of 1:1000. The patient was re-x-rayed on August 7, 1933, and the roentgenogram revealed the fact that the right lung was not quite expanded, particularly at the base, and there was still a slight amount of fluid present at the right base. No pathologic condition had ever been found in the lung proper in this case. On October 14, 1933, we were informed that the patient was in good physical condition when last seen.

The fluid which was removed from this patient on March 19, 1933, produced no growth on any of the culture media employed. All customary types of media were inoculated and remained sterile. Two guinea pigs were inoculated with the fluid, the animals remained well and no lesions were found ten weeks after injection. Smears from the centrifugalized fluid showed no organisms of any kind. Through Dr. Locke we learned that six guinea pigs were injected at the Hygienic Laboratories in Washington and only one of these exhibited positive evidence of tularemia. This is an important point, as it shows the fallacy of employing

Fig. 1
Case 1. Tularemia with extensive pleuritic effusion.

Fig. 2
Case 1. Partial collapse maintained for some time after removal of fluid which was replaced by air.

but two pigs when the organisms cannot be found in the centrifugalized pleural fluid.

Case 2.—K. R., a white man 39 years of age, farmer by occupation, was admitted to Oteen on December 26, 1932, for the treatment of pulmonary tuberculosis. The patient claims that his first illness referable to his chest was during 1923, when he had severe coughing spells and blood spitting. His physician sent him to the Walter Reed Hospital with a diagnosis of tuberculosis. There he was advised that he had no demonstrable tuberculosis. He claims that he has been feeling badly for the last five years and he had feelings of exhaustion, pains in his chest and a cough. He claims that he was under the constant care of a physician in his home town. On November 1, 1932, he was taken with pains in the back of his head and then became unconscious, remaining in this condition for several days. He denies any knowledge of how long this state persisted. He claims there was no chill at the onset of the condition and says that he raised some dark, bloody looking sputum during the later course of his illness. He was hospitalized at a county hospital, where he remained more than four weeks prior to his admission at Oteen. His chief complaint at that time was: shortness of breath; some pain in the chest; and weakness. Physical examination showed a well developed, emaciated white man, who looked very ill. There was no enlargement of either cervical, axillary or inguinal glands. Nothing unusual was found on examining the abdomen, heart and blood vessels. The mobility of the thorax was restricted on both sides. Resonance was diminished from the eighth dorsal spine to the base on the right side. The whispered voice was apparently normal, breath sounds were unaltered, pleuritic crackles and rubs could be heard in the mid-axillary line and at the base. On the left side, resonance was diminished at the base posteriorly. The breath sounds were unaltered, the whisper was normal, and pleuritic rubs were found at the base posteriorly. Roentgenogram shows the apex of the right lung to be clear. There was a marked increase in the hilum shadow and disseminated areas of decreased penetration were found scattered throughout the pulmonary fields below the first interspace. The center of these areas was rather heavy, but shaded out to the periphery. Evidence of a great deal of acute exudate could be seen in the lower lobe. In the left lung a few strands of fibrosis and calcified nodular densities extended into the apex. An area of acute exudate extended from the hilum into the lower portion of the upper lobe and was sharply defined by interlobar tissue. Small, fairly well circumscribed areas of decreased penetration behind the second and fifth interspace and near the hilus were also seen. Both sides exhibited definite areas of pneumonic consolidation, particularly in the right lower lobe and left upper lobe. From a roentgenologic standpoint one would say that the changes represented a lobular pneumonia (12-27-32).

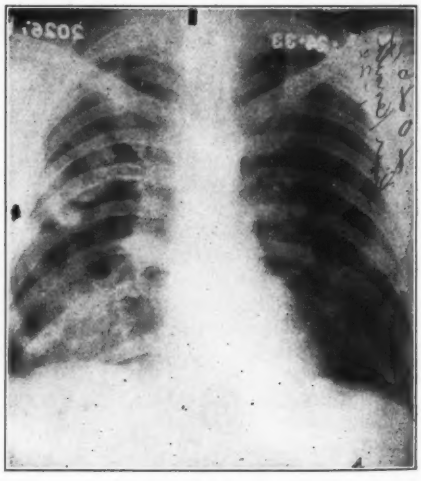

Fig. 3
Case 2. Increase in hilum shadow and disseminated areas of diminished penetration.

By January 7, 1933, the effusion of the left base had completely disappeared and there was marked clearing in the left lung and to a somewhat less extent in the right lung. Further clearing was evidenced on January 24 and March 3; and on April 1 only a small, soft lesion was seen behind the first and second interspace on the right side with diffuse fibrosis in both lungs. The condition was practically the same on May 12, 1933.

To summarize these series, there were exhibited at the beginning fairly well localized areas of acute exudate in both fields, more marked on the right, with a small pleural effusion in the left side. Healing took place both by absorption of the exudate and by formation of fibrous tissue. Permanent damage was done to these lungs by diffuse fibrosis and thickening of the trunks that extended well out to the periphery in both pulmonary fields.

Laboratory findings were as follows: all tests for syphilis were negative. Hemoglobin was 70; erythrocytes were 3,900,000; leukocytes 15,000; polymorphonuclears 34 per cent; band forms 44; metamyelocytes 2; small lymphocytes 11; large lymphocytes 2, and eosinophils 2. The urine had a specific gravity of 1.020 and contained occasional hyaline casts and white corpuscles. On February 1, 1933, an enlarged gland was found in the left axillary space and on March 1 he had phlebitis in the left axillary vein. On April 18 a lymph node was removed from the left axilla and this showed many small abscesses of undermining character. There were no giant cells and the picture was quite different from what one would expect in tularemia. A sinus established itself and pus from this sinus showed neither acid-fast organisms nor were other organisms found on smears. Cultures were negative for organisms, only the ordinary media having been employed, as, at this time, no suspicion of tularemia existed. All sputa examined were negative for tubercle bacilli and because of the indefinite findings it was decided to test the patient for tularemia. On May 8 a positive agglutination test of 1:680 was obtained. On questioning the patient it was found that he had a definite history of tularemic infection and a scar on one of his fingers. He said that he injured his finger during the squirrel hunting season and the lesion formed was cared for in the hospital of his home town.

Case 3.—Patient H. E. B., a colored man, aged 42, farmer by occupation, entered our hospital on March 13, 1933, for the treatment of pulmonary tuberculosis. Prior to his admission he had been confined to bed at home since November, 1932. He had not been well for some time and his complaints were of chills, pains in the chest, dizziness and weakness. His attending physician made no diagnosis. Physical examination as far as his chest was concerned showed nothing unusual in the right lung. In the left lung the breath sounds were harsh over an area between the first interspace and third rib anteriorly, and from the third to the fifth dorsal spine posteriorly. On percussion there was increased dullness over the same area and the whispered voice was also increased. There was a discharging sinus in the left axilla which had been draining for the preceding three months following an acute disease of the lungs. There was also a small scar over the internal malleolus of the humerus and a small scab in the anterior axilla. Axillary lymphadenitis was present.

All tests for syphilis were negative. A blood count on admission showed: erythrocytes 4,200,000; leukocytes 7,400; polymorphonuclears 51; band form cells 4; small lymphocytes 29; large lymphocytes 3; eosinophils 2; monocytes 11; hemoglobin 65. Ten sputum specimens were examined for tubercle bacilli and were negative. Material from the draining sinus was never studied. The sinus healed up completely.

Roentgenologic examination on admission showed diffuse fibrosis and thickened trunks throughout the fields in the right lung. The hilum shadows were increased in width and density and contained several calcified nodules. The left lung revealed soft, fuzzy areas near the hilum at the level of the third interspace. Markedly thickened trunks extended from the hilum well out to the periphery in both the upper and lower lobes. On April 17, 1933, roentgenogram showed considerable contraction of the soft lesion near the hilum. Further studies on April 21 and May 15 revealed much the same appearance. Residuals from these lungs were characterized by marked increase in width and density of hilum shadows on both sides; diffuse fibrosis and thickened trunks extended well out to the periphery and a moderate pleurisy was present in the left costophrenic sinus. The original diagnosis was unresolved pneumonia. It was changed on April 20, when evidence of tularemia was sought, and an agglutination test was positive at 1:640. The diagnosis now was that of bronchopneumonic infiltration of the left upper lobe and pleurisy at the left costophrenic sinus caused by the bacillus of tularemia.

Both *Case 2* and *Case 3* were discharged well, with comparatively slight residues in pleura and lung.

Case 4.—W. P., a colored man, aged 36, taxi driver by occupation, entered the hospital for the treatment of pulmonary tuberculosis on December 29, 1932. He dated the onset of the disease to March, 1931. He claimed he had an elevated temperature, pain in the chest, cough and blood streaked sputum. The attending physician gave him no diagnosis at that time and he returned to work in about a month. However, in less than a month he was sick again and confined to bed for two months. Another physician took care of him at that time and said that the patient "had a spot on his lungs." He consulted still another physician, who confirmed the pulmonary diagnosis. Shortly before his admission he was examined by a physician of the Veterans' Administration Service, who was responsible for his admission to Oteen. The patient claimed that he had been having night sweats for the previous two or three months, a choking sensation, pain in the chest, fever, cough and expectoration. He was a fairly well nourished, well developed male. His temperature was 38.2° C., pulse rate 120; respiration rate 34, and his blood pressure was 124 systolic and 70 diastolic. The cardiovascular system showed no abnormality. The inguinal and cervical lymph nodes were slightly enlarged. The spleen was not palpable nor tender. There was no evidence of disease of the nervous system, muscles, bones, joints or genito-urinary system. He denied venereal infection of any kind. He had a small scar on the right thigh. The right lung on percussion evidenced impairment in note from the third rib to the sixth dorsal spine with bronchovesicular breathing, increased whispered voice and showers of medium coarse rales over that area. A pleurisy rub was heard throughout. There was no increase in tactile fremitus. On the left side impairment of the note, bronchovesicular breathing and increased voice sounds were heard from the first interspace to the fourth

dorsal spine. There were no rales. The diagnosis at this time was tuberculosis, pulmonary, chronic, moderately advanced, with chronic pleurisy on the right side. The roentgenogram at this time concurred with the above diagnosis and in addition a diagnosis of cavitation in the third interspace was made. The cavity showed a fluid level. Repeated roentgenologic examinations maintained this diagnosis until September 14, 1933, when the possibility of a pulmonary abscess was seriously considered. On September 25, evidence of marked, diffuse exudate was found in the right lower lobe and the films made on that day indicated the existence of a non-tuberculous, suppurative condition of the right lung, with acute extension into the right lower lobe, which had occurred during the previous eleven days. On October 6, the diagnosis of abscess of the right lung was fully established.

All laboratory tests for syphilis were negative. Blood examination showed: hemoglobin 70; erythrocytes 3,750,000; leukocytes 9,000; polymorphonuclears 29; band form cells 47; small lymphocytes 22; and monocytes 2. Twenty sputum specimens were negative for tubercle bacilli. The sputum was of the three-layer type and contained red corpuscles, gram-positive and gram-negative diplococci, among which were many streptococci, and also gram-positive and gram-negative bacilli. No one type was predominant. The urine showed nothing unusual. The Mantoux tuberculin tests were negative. On October 5, an agglutination test for tularemia was positive at 1:2560. No history could be elicited to account for this finding. He died on October 17, 1933, and no permission for autopsy was obtained.

What seems to be the first postmortem report that clearly describes tularemia in man is that of the patient of J. Russell Verbrycke, Jr. The autopsy was performed by Maurice Sellinger, who found about 100 c. c. of cloudy, yellowish fluid in each of the pleural cavities. The surface of the lower portions of both lungs was covered with a moderate amount of greenish yellow lymph, the upper lobe of the left lung showing some edema and some congestion. The lower lobe was intensely hyperemic and filled with blood, and scattered through its substance were a number of hard, irregular, discrete nodules varying in size. On section these nodules were fibrinous and white and did not seem to be surrounded by an area of inflammation. The size of these nodules varied from that of a shot to a walnut. The other lung presented essentially the same picture. Microscopic examination showed caseous necrosis containing granular debris and the necrotic area was surrounded by a zone of small lymphocytes. No giant cells were present. There was definite thickening of blood vessels and some of the necrotic areas were partially enveloped in a capsule of connective tissue.

The bronchopneumonic picture has proven to be a general finding in these tularemic cases that came to necropsy. In addition, bronchial lymph node enlargement, infarction, cavitation, abscess formation, necrosis and pleurisy are mentioned. Permar and McLachlan described the pathology of tularemia as characterized by interstitial and alveolar necrosis, probably caused by arterial and venous thrombosis of the small caliber vessels. The thrombosis is induced by edema in the arterioles and venules. Vascular changes are stressed by practically all investigators and microscopic examination shows either complete or partial obliteration of the lumen of the blood vessel associated with the necrotic area. Microscopically, cells of all types can be found. There may be lobulated cells and phagocytic mononuclears; plasma cells and epithelial cells. Giant cells of the Langhan's type are not found in the lesions of the lung, though they seem to be present in the bronchial lymph nodes. The singular absence of the Langhan's type of giant cells seems to be a strong characteristic of the lesion produced by tularemia which, on gross examination, may resemble a tubercle. It is believed that the absence of the giant cells is due to the rapidity of the pathologic process which goes on in the lungs.

Of the various ways by which we are able to visualize the intrathoracic changes the roentgenogram alone allows study *in vivo*. Unfortunately, there is nothing specific about the roentgenologic findings which would enable one to make a diagnosis of tularemia. Increase in hilar shadows, fibrosis, exudate, pneumonic consolidation, thickening of bronchial trunks, abscess formation, cavitation and pleurisy with or without effusion may occur in the presence of tularemia, tuberculosis, pulmonary neoplasms and other conditions. These are findings the existence of which has been confirmed by autopsy; yet these pathologic changes never appear in such combination as to permit a definite conclusion of their tularemic origin. A history of lymphadenitis or some other lesion in association with positive laboratory findings is necessary to clear the diagnosis. The changes in the blood vessels as found in the postmortem specimens cannot be utilized for diagnostic purposes. Their effect upon pulmonary structures is understood only when the diagnosis of tularemia is established already.

In conclusion we wish to repeat that clinical, roentgenologic and gross pathologic changes within the thorax may be those of increase in hilus and bronchial lymph nodes, exudation, pneumonic consolidation, abscess formation, cavitation, vascular changes, necrosis, thickening of bronchial trunks, fibrosis and pleurisy with

or without effusion. The microscopic findings are those of vascular changes, necrosis, proliferation of fibrous tissue. Endothelial cells, mononuclear and polymorphonuclear leukocytes are seen. The Langhan's type of cell is usually absent in the pulmonary lesions, but can be found in the affected bronchial lymph nodes.

Unexplained pulmonary and pleuritic conditions should always be investigated, as they may be tularemic in origin. Patients with intrathoracic complications may recover unless the condition has advanced too far. We believe that recovery is in part due to bed-rest applied early. To avoid any hazard to the patient and to recognize intrathoracic complications early, a roentgenogram should be taken of every patient with tularemia.

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OSTEOMYELITIS*

By W. H. Goodwin, M.D.,
University, Virginia

Osteomyelitis is rather a hackneyed subject, but I have chosen it because of its wide incidence, high percentage of mortality and morbidity, and its economic importance to society. In this discussion I wish to emphasize the value of repeated radiological studies in guiding the surgeon and I also wish to stress the necessity of retentive apparatus to prevent deformity.

This disease is prevalent in both rural and urban populations and it has been said that city children suffer from osteomyelitis more than do country children. My personal experience does not coincide with this observation and our graduates who go to the various city hospitals frequently express surprise that they see relatively fewer cases than they did at the University of Virginia Hospital.

Wakeley,[1] writing in the *British Medical Journal,* says that acute, pyogenic osteomyelitis in children is a disappearing disease due to better sanitation, removal of infected tonsils and the decrease of debilitating and deficiency diseases. These preventive measures are widely practiced in this country, but I am sure our incidence of the disease is as high as it was many decades ago. Our well trained pediatricians, however, are referring these cases to the surgeon in the earlier stages of the disease.

Osteomyelitis signifies an inflammation of bone, but this is not sufficient to define the disease usually seen, since an endo-osteomyelitis as well as a periosteomyelitis are produced soon after the infection begins. I shall limit my discussion to blood borne osteomyelitis of the pipe bones which is usually seen primarily in childhood, and omit osteomyelitis resulting from open fractures and other injuries, such as gunshot wounds. These latter injuries, however, are very serious and during the World War presented problems of great magnitude, necessitating prolonged hospitalization, loss of man power and hard work for the entire staff of a military hospital. There is today a widely scattered population of permanently disabled citizens, victims of traumatic osteomyelitis, who are increasing the burden of taxation of nearly every nation.

Osteomyelitis must be classed with our major surgical problems. One of my associates has recently published an article on the economic burden of osteomyelitis. This disease is primarily one of the poor classes, a result of poor physical conditions and lack of cleanliness. The well-to-do family can secure proper treatment for this disease without undue hardship. It is a terrible burden to the middle class family that does not want charity. All of us have seen children with osteomyelitis who have entered the wards of a hospital as pay cases, but who finally had to be put on the charity list because the parents could pay no longer. Stone[2] has shown that the free case costs the hospital over $350.00 and we must add to this amount the cost of subsequent treatments in the out-patient department and readmissions to the hospital for sequestrectomy or other operative procedures. This burden is borne by the taxpayer or a philanthropist. Because of the prolonged illness and

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*From the Department of Surgery and Gynecology, University of Virginia School of Medicine.

hospitalization, the education of these afflicted children is sorely neglected, and this, with their frequent permanent physical disability, handicaps them in their struggle for a position in the life of their community.

The micro-organism responsible for blood borne osteomyelitis is usually the *Staphylococcus aureus*, but the streptococcus is also frequently the offending germ. Rarely other bacteria are found in the primary lesion. The source of the infection is usually found in furuncles, carbuncles, abrasions, septic tonsils, tooth sockets and sinuses. Infection of the intestinal tract is sometimes the primary focus. The blood stream infection is usually transient, but in the fulminant type of the disease the bacteriemia persists and if the patient survives there will form multiple abscesses and quite probably many of the bones will show osteomyelitis. The mortality in the fulminating type of the disease is quite high, regardless of the treatment instituted.

As an etiological factor, trauma must be given an important place. This injury need not be a severe one. We rarely see osteomyelitis occurring in the shaft of a pipe bone that has been fractured unless there is an open wound. Slight separation between the epiphysis and diaphysis produces a lesion of lowered resistance. The arteries in this region are terminal and small and their walls are inelastic. The veins begin in lakes where the current is very sluggish and bacteria are easily deposited in this bony tissue of lowered resistance on the diaphyseal side of the epiphyseal line.

The infection progresses rapidly and seeks an outlet. The cortex is thinnest where the periosteum is attached to the metaphysis and the infection rapidly passes through the cancellous bone and perforates the cortex. The pus will burrow under the periosteum away from the epiphysis and while under tension the infection will pass through the haversian canals to the medullary cavity and nutrient vessels will become thrombosed, causing death of bone. The infection often travels from the cancellous bone to the medullary cavity and out the haversian canals. Finally the periosteum will rupture under tension and large, dissecting cellulitis of the soft parts will result.

The neighboring joint will usually escape the infection due to the protecting capsule. Osteomyelitis of the neck of the femur, however, often results in infection of the hip joint. The lymph stream also may carry infection into the neighboring joint, and infrequently the infection perforates the epiphyseal plate, involving the epiphysis and also the joint.

The diagnosis of osteomyelitis must be made on the history of some possible focus of infection, sudden and severe, throbbing pain near a joint, but not in the joint, a point of tenderness near the epiphyseal line, high temperature, possibly chills, high leukocytosis and increase in polymorphonuclear leukocytes. With care the adjacent joint can usually be manipulated without much pain.

In osteomyelitis of the upper end of the femur, pain is frequently referred to the knee joint, but the joint can be flexed. Swelling is not present in early osteomyelitis. Under these circumstances the clinician and roentgenologist may direct their attention to the region of the knee joint and overlook the lesion above.

Acute rheumatic fever is the commonest condition which gives trouble in the differential diagnosis. It is rarely monarticular, the inflammation is definitely in the joint and the leukocyte count is not so high as in osteomyelitis. The pain with swelling and tenderness is in the joint. All movements of the joint are painful and produce muscle spasm. The toxemia is apt to be much more severe in acute osteomyelitis. If the joint happens to be swollen and contains fluid it should be aspirated and bacteriological studies made.

Unfortunately the roentgenogram is of no aid to the surgeon in making an early diagnosis, and to wait for positive x-ray findings is disastrous. We have all seen cases in which the periosteum was widely separated from the cortex by pus and yet the x-ray film showed normal bone. It must be realized, however, that periosteum is never visualized on the film until calcification has occurred, after irritation over a period of at least one week.

Fig. 1 is the film of the left tibia of a boy eleven years of age with very acute osteomyelitis of ten days' duration. At operation the periosteum was found stripped from the anterior surface of the cortex from the upper to the lower epiphysis. The anterior surface of the tibia was removed and the medullary cavity packed with vaseline gauze. A plaster cast was applied. Frequent films in this case have been made to

guide the surgeon in subsequent sequestrectomies (see *Figs. 2* and *3*).

Fig. 4 is a film showing marked destruction of the tibia of a boy twelve years of age with very acute osteomyelitis which had been present for five weeks before he entered the hospital for treatment. The operation consisted of longitudinal bisection of the upper two-thirds and removal of the entire lower third of the tibia. During the nine months this boy has been under treatment, five roentgenograms have been made

Fig. 1
No evidence of bone pathology can be demonstrated.

Fig. 3
There has been much new bone formation since last x-ray examination. There is no definite evidence of further sequestration.

Fig. 2
There is very marked destruction of almost the entire shaft of the tibia. An involucrum is being formed.

Fig. 4
Showing marked destruction of the entire shaft of the tibia and slight periosteal reaction. The fibula shows some periosteal reaction.

and two subsequent sequestrectomies have been done.

Fig. 5 shows the result at the present time. A gutter plaster cast has been continuously worn, but we do not believe there is sufficient new bone formation in the lower third of the tibia to warrant weight bearing.

Fig. 5
On the inner aspect of the tibia one and one-half cm. above the lower epiphyseal line there is a bone area suggestive of a sequestrum. There is not enough new bone formation for weight bearing.

Fig. 6
There is shown periosteal elevation below the lesser trochanter.

Fig. 6 is a roentgenogram of a boy ten years of age who had complained of pain in his left groin of three weeks' duration, following a minor injury. He was very septic when admitted. The film showed periosteal elevation below the lesser trochanter. In this region the bone was drilled and pus was found under tension. The drill punctures were then enlarged.

Fig. 7 shows marked destruction of bone and joint space. After further drainage the extremity was internally rotated and a hip cast applied. This patient is still in the hospital and he will have roentgenograms made from time to time to aid in his further treatment.

Fig. 8 shows extensive osteomyelitis of the left ulna and radius in a girl two years of age.

Fig. 7
Marked destruction of bone and joint space.

Fig. 8
The lower two-thirds of the shaft of the radius is an apparent sequestrum. Involucrum is forming. There is a second sequestrum formed by the head of the radius.

Numerous films have been made in the treatment of this case and four operations have been done to remove sequestra.

Fig. 9 shows mesial angulation which might have been prevented by adequate retentive apparatus.

Fig. 9
There is marked new bone formation just above the lower epiphyseal line of the radius. Mesial angulation of distal portions of ulna and radius.

Fig. 10
No bone pathology can be demonstrated.

Fig. 10 shows no bone involvement in a girl eight years of age with very acute osteomyelitis of four days' duration. The cortex was drilled in the region of the great trochanter and milky fluid found under tension. The drill openings were enlarged. Subsequent films showed no advancement of the disease downward, but did show destruction of the neck and head of the femur (see *Fig. 11*).

The sinus persisted and the patient remained

Fig. 11
The neck of the femur has been destroyed and the epiphysis is free.

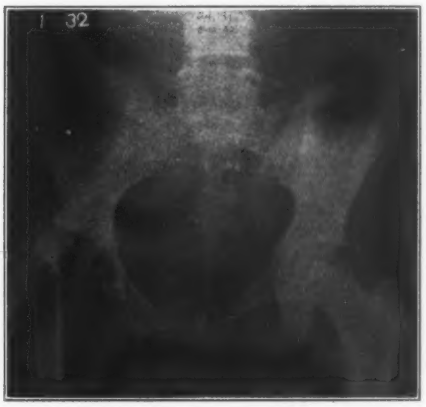

Fig. 12
The texture of the bone in the acetabulum and the upper end of the femur is more regular. The head of the femur has been removed surgically.

septic until the head of the femur was removed. Four years have elapsed and the child has had no recurrence (see *Fig. 12*). There is shortening, but the child has good function. After she attains her full growth some operative procedure may be advised to equalize the length of her lower extremities.

Fig. 13
A chronic bone abscess in the mid portion of the shaft of the femur.

Fig. 14
The result one year after surgical drainage.

If the causative organism of osteomyelitis is of low virulence and the patient has good resistance, a chronic abscess may form. This may be near the epiphyseal line at first, but as growth takes place the cavity may be pushed farther and farther toward the mid portion of the shaft.

Fig. 13 shows such an abscess of the femur in a young woman twenty-three years of age. She complained of pain in the right lower quadrant of the abdomen, which radiated down the thigh. This cavity was uncovered and packed with vaseline gauze. This patient made a rapid and excellent recovery (see *Fig. 14*).

Fig. 15 shows a chronic osteomyelitis of the left femur of a woman thirty years of age. She gave a history of having had sinusitis several years previously accompanied by multiple abscesses. An abscess of the left hip was drained, but x-ray failed to demonstrate any bone lesion in the region of the hip. The usual osteotomy and drainage were done for this supposed latent lesion and there followed such a fulminating infection, with involvement of the knee joint, that amputation through the mid thigh was necessary to save the life of the patient (see *Fig. 16*).

No one should be dogmatic in his statements concerning the treatment of osteomyelitis. There are cases so fulminating in nature that the patient will die regardless of the nature of

Fig. 15
Chronic osteomyelitis of the mid portion of the shaft of the femur showing central rarefaction and lamellated periosteal thickening.

Fig. 16

After surgical intervention there is almost complete disintegration of the femur from the site of operation down through the condyles.

treatment. The progress of this disease should be measured by hours and the sooner the diagnosis is made and treatment instituted, the better will be the result. We rarely abort the disease by early incision and drilling, but bone necrosis is minimized by this procedure. The periosteum is rarely stripped completely from the cortex of bone and I prefer a partial diaphysectomy to a complete one, because the remaining shaft will act as a splint until a strong involucrum has formed. Subsequent operations will usually be necessary, however. I should like to throw out a warning against surgical shock when a large sequestrum is removed in a child who has carried this infection many months. Good nursing care is very essential in the management of osteomyelitis and frequent transfusions should not be neglected.

We have not made a routine practice of the Orr method of treatment because it does not seem to be surgically ideal and we fear the odor would put us in disrepute with the pediatric department.

The maggot treatment of osteomyelitis has staunch advocates in this country, but our institution is in a relatively small community and I fear we should have difficulty in explaining that we placed maggots in the wound purposely.

We hear much about the preventive or prophylactic treatment of many diseases, but little concerning osteomyelitis. The public is rapidly becoming educated concerning the precancerous lesion. The danger of delayed diagnosis and treatment in acute appendicitis is rapidly becoming the common knowledge of the public. It knows practically nothing, however, of the tragedies of acute osteomyelitis, and physicians are too prone to designate the process as growing pain or rheumatism. The internist often mistakes the condition for acute rheumatic fever and the surgeon often makes a primary diagnosis of injury, such as separation of an epiphysis.

COMMENT

(1) Because of its universal incidence, high mortality and morbidity and its economic aspects, osteomyelitis must be regarded as a major problem.

(2) It is essential that the surgeon be guided by frequent roentgenograms in the management of this prolonged disease.

(3) The roentgenologist should be a good clinician to give the surgeon the best aid and the clinician should not mislead the roentgenologist.

(4) Proper retentive apparatus should be employed and therefore the orthopedic surgeon should be frequently consulted. It is debatable whether osteomyelitis should not be cared for by the orthopedist.

(5) Early diagnosis and prompt, intelligent treatment will give the best results. After the initial operative procedure, the surgeon in charge should use his best judgment and resources regardless of dogmatic statements to the contrary in the management of the particular case.

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DISCUSSION (*Abstract*)

Dr. O. L. Miller, Charlotte, N. C.—The essayist has mentioned the importance of early attention to the prevention of deformities in extremities when bone infection occurs. I wish to emphasize the physiologic and economic importance of the latter.

Osteomyelitis varies in its behavior from simple transient infection in some cases to fulminating sepsis in others. The first and immediate concern in most instances is preservation of the individual's life and this is never 100 per cent successful no matter how energetic the treatment. Immediately after the serious phase of bacteremia is dealt with comes the responsibility of preventing deformity and preserving the maximum usefulness of the extremity or part involved.

As a rule where a patient has weathered a few days of acute osteomyelitis and a painful extremity is being nursed, much physiological rest, both locally and generally, can be obtained by some type of retentive apparatus. This is advantageous in addition to prevention of or early correction of deformity. The essayist has mentioned the economic cost of osteomyelitis. Much of this cost is occasioned by neglect of early attention to potential deformities associated with the disease.

Osteomyelitis about the hip joints is usually associated with characteristic flexion and adduction or abduction deformity. Early after or at the time of surgical drainage traction on the leg should be applied to prevent or correct deformity. Plaster of paris spica casts, windowed for dressings, are frequently indicated. These measures will preserve functional alignment and prevent pathological dislocations and fractures. The same general measures hold for preventing flexion deformity at the knee when infection occurs near that joint. In the latter, leg casts will usually suffice and spica casts are not often required. A very common deformity we see in orthopedic hospitals is an equinus deformity in the foot where an osteomyelitis has been treated in the lower end of the tibia or in the bones of the foot. The foot should be held at a right angle to the leg by some type of splint from the first invasion of the disease. If the ankle becomes ankylosed, it is in good walking position without further treatment or hospital care. The same holds true at the hip and knee. When osteomyelitis affects the bones of the upper extremities certain deformities may occur, but they are not so hazardous as in the lower extremities. Every effort should be made to maintain abduction of the shoulder. The elbow should be nursed at or near a right angle and the wrist in the cock-up position.

In severe osteomyelitis of the long bones pathological fracture is not an uncommon complication. This can always be prevented if, in such threatening cases, snug-fitting leg casts are applied to protect the member and support the young involucrum for a few weeks. My feeling is that osteomyelitis is more or less a self-limiting disease. Patients should be subjected to the shortest type of operation for drainage. The shock can be minimized and the operation made more accurate by the use of tourniquet in most instances. Protection of the involved extremities should be continuous and further conservative surgery is indicated when sequestrectomy must be done. Diaphysectomy is an unfortunate operation and, I believe, never indicated. I have had no experience with the maggot treatment, though some very favorable reports on its use have been made.

Dr. Ralph S. Bromer, Philadelphia, Pa.—From the roentgenological standpoint, the diagnosis of osteomyelitis in the chronic stages is sometimes difficult. Lovett and Wohlbach some years ago called attention to the difficulty of differentiating chronic osteomyelitis from syphilis and tuberculosis, and mentioned three instances in which the differential diagnosis is difficult. The first occurs in the case of so-called Brodie's abscess or similar areas of bone absorption, where the causative agent may be either a pyogenic organism or the tuberc'e bacillus. Here the only differentiating point is the tendency in chronic osteomyelitis to form a dense reaction about the abscess cavity. The second instance is the occurrence of triangular or semi-circular areas of rarefaction and absorption, the bases of which rest on the epiphyseal line. In this case, the differentiating points again are the amount of reaction or increased density of bone about the area of absorption, the history, and so on. The third instance is the finding of dense elliptical cortical and periosteal thickening, usually in the middle of the shaft. Here it is often impossible to differentiate between chronic osteomyelitis, syphilis and the hypertrophic type of shaft tuberculosis from the roentgenogram alone.

Dr. Franklin B. Bogart, Chattanooga, Tenn.—As a radiologist I wish to emphasize what appears to me to be an important duty of ours in cases of osteomyelitis that are brought to us for radiographic examination early in the disease. These cases are often in the hands of general practitioners or surgeons who do not know or who have forgotten how very important early operation is and how much it may mean to the patient in limiting the disease and reducing the amount and duration of disability.

It has been my privilege in the past two years to see a small series of cases of osteomyelitis operated upon during the first twelve to twenty-four hours of the disease. The marked limitation of the extent of the disease with a very small sequestrum or with no sequestrum in a few cases has been striking, as have its short duration and the end-results.

When the radiologist makes an examination in an early case he should be enough of a clinician to recognize the probable nature of the case. When he reports negative x ray findings to the physician in charge he should suggest in a diplomatic way the possibility of an early osteomyelitis, and point out the necessity of early surgical interference.

TREATMENT OF PROSTATIC CANCER*

By W. Calhoun Stirling, M.D., F.A.C.S.,†
Washington, District of Columbia

Recent statistical studies show that approximately 25 per cent of men past sixty years have prostatism and that one-fifth of these will become cancerous. The 1932 Bureau of Census Report shows 5,438 prostatic cancer deaths in 1932. This represents an increase of 11 per cent over the preceding year. There were 1,304,109 deaths in 1932 from all causes; 128,181, or 9 per cent, were reported to be from malignancy. Carcinoma of the alimentary tract, uterus, breast and the male reproductive organs, respectively, were the most common sites of malignancy. Prostatic cancer represents 57 per cent of all urinary tract cancers, an increase from 3.9 per 100,000 in 1930 to 4.5 per 100,000 in 1932. Rector says there are three living can-

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†Associate Professor Genito-Urinary Surgery, Georgetown Medical School.

Fig. 1

Osteitis deformans showing marked osteoplasia in both ilia, symmetrical with no evidence of osteoclastic changes, common to malignancy. Roentgenograms of the skull and long bones will usually differentiate the two conditions.

cer patients for each death, a very impressive aggregate.

It is generally agreed that prostatic cancer is slow growing, late in metastasizing and frequently is overlooked unless it is accompanied by benign hypertrophy, as happens in 75 per cent of the cases. The growth is so insidious and the infiltration so early that less than 10 per cent are recognized clinically before the prostatic capsule is invaded. Although Bumpus reports bony metastasis in 30 per cent of the cases, Barney and Gilbert found it in 50 per cent, an additional 10 per cent showing regional lymphatic involvement. Barringer found that in only from 2 to 5 per cent of all such cases seen at the Cancer Memorial Hospital was the cancer confined to the prostatic capsule. Colston reports 1,040 cases of carcinoma of the prostate seen at the Brady Institute and found only thirty-six cases suitable for radical perineal prostatectomy. These reports show how few cases of cancer are seen early enough to be amenable to radical surgery. Since the family physician is the first to see these patients, his examinations should always include the prostatic gland in men past fifty years of age. It is only by the early recognition of this insidious disease that the incidence of cures can be increased. The clinical course of prostatic carcinoma is dependent on the structural type of tumor, different forms appearing as radically different diseases (Ewing). Because the type of cancer, rate of growth, area involved and amount of obstruction differ in each patient, only broad principles of treatment can be outlined. The treatment of malignancy of the prostate is at best very unsatisfactory, but the average duration of life in cases not treated is less than three years. If metastasis is present, this period is cut in half. The lack of agreement among genito-urinary surgeons as to the relative merits of radical surgery, radium, x-ray and the newer procedures of intra-urethral surgery in treating prostatic cancer, suggests the following summary of sixty such opinions, representing a cross section of those specializing in urological surgery.

The cases were divided into three groups: (1) those in which the malignancy was confined to the prostatic capsule with absence of metastasis and with minimum seminal vesicle involvement. This group comprises from 5 to 10 per cent of all prostatic cancer. (2) Those with extensive local infiltration or presenting widespread metastasis without urinary obstruction. (3) Those having urinary obstruction together with the findings enumerated in Group 2. In the first group, twelve surgeons thought radical prostatectomy was the procedure of choice, Young's radical perineal prostatectomy being the method preferred. Seven said they rarely saw a case early enough to justify its use. Five surgeons used the suprapubic approach, whereas thirty-five said that radical prostatectomy had been unsuccessful in their hands. Young reports forty-two cases in which radical prostatectomy was performed for cancer of the prostate, with an operative mortality of 9.5 per cent, 52 per

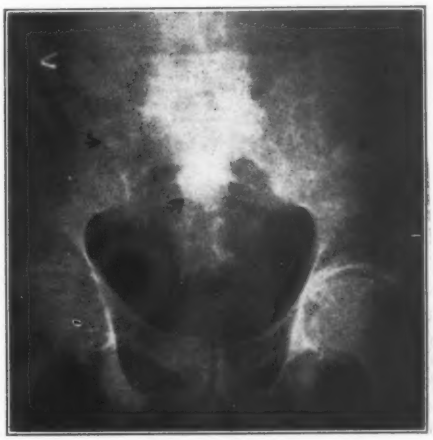

Fig. 2

Metastatic bony osteoplasia of the pelvis and sacrum as a result of cancer of the prostate gland. Arrows indicate the bony changes characteristic of prostatic metastastic changes.

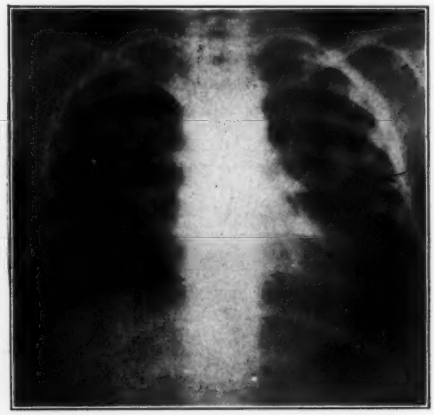

Fig. 3
Plain roentgenogram of chest showing metastasis from prostatic malignancy. Arrows indicate osteoplastic changes.

cent of those surviving operation being cured over five years. G. G. Smith reports fifteen of forty cases operated upon by the same method without recurrence and apparently cured. He says not over 10 per cent of the cases are suitable for this method. Bumpus reports 178 cases in which prostatectomy was performed for carcinoma, the average length of life after radical operation being thirty months, whereas 125 patients had palliative cystotomy alone, with an average duration of life of twenty-four months, only six months less than those having the radical operation. Lower says: "We practically never see any cases which are operable." Chute advises a partial perineal prostatectomy for cancer and repeats it if obstruction redevelops. Keyes prefers radium implantation by Ferguson's method and says the validity of the urethral sphincter is not threatened. Increased incidence of surgical cures requires early recognition and prompt and complete removal of the malignant growth.

Under group 2 the great majority of the writers agree that palliative measures for the relief of pain, control of bleeding and supportive measures are the only indicated procedures. Forty writers used deep x-ray or radium to control the metastatic pain and bleeding, and to retard the tumor growth. Ten per cent of prostatic cancers are radiosensitive and should have preliminary radiation to determine the type of tumor as well as to attempt to retard the malignant process. In many cases a definite retrogression of the malignancy has been noted as well as a decrease in the edema and congestion at the bladder neck. The futility of a cure by x-ray alone has been pointed out by Barringer, because only one and one-half erythema doses can be delivered to the prostate, whereas from ten to fifteen erythema doses are required to control the majority of cases. The resultant fibrosis may retard the malignancy and decrease pain and bleeding. That radium has the power of destroying cancer cells, is shown by the excellent results in breast and uterine cancer. However, the inaccessibility of the prostate gland makes it very difficult to insure complete irradiation. Damage to the rectal and vesical mucosa frequently has been observed following large doses of radium. Recently Russell Ferguson has devised a new technic for radium implantation suprapubically, using a special apparatus for the insertion of gold radon seeds, and reports that fourteen out of sixteen cases seen in the last twenty-four months were alive with better than average primary results, two dying following resection accidents. He uses from 25 to 75 millicuries divided into 2 mc. gold seeds. These results are very gratifying and represent a distinct advance in the treatment of prostatic malignancy. Other writers use a cross-fire through the perineal, urethral and suprapubic avenues. Several writers, including Marion, Leugeu and Pap'n among the French urologists, have discontinued the use of radium because they have seen no beneficial results from its use.

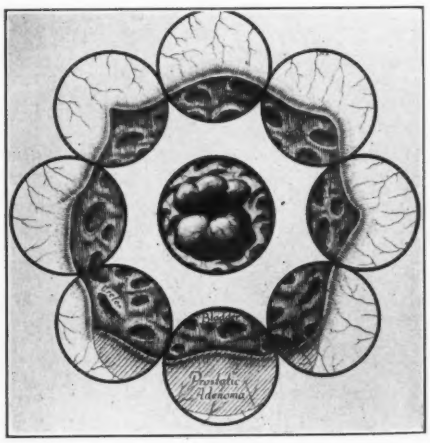

Fig. 4
Composite right angle cystoscopic impression of obstructed bladder neck with retrograde view in center. The latter is of great help in determining the site of resection.

Fig. 5
View of skull in case of malignancy showing the characteristic bone destruction. Note the wooly appearance in the x-ray picture. The scalp was covered with large firm nodular masses.

In Group 3, where urinary obstruction predominates, deep x-ray and palliative cystotomy were formerly used by forty-two surgeons. However, since the perfection of intra-urethral procedures, the majority of these writers have discontinued palliative cystotomy and have adopted resection, insuring the patency of the urethra by repeated resections, if found necessary. Thirty used it in conjunction with x-ray or radium. Aside from the question as to the merits of resection in benign lesions of the prostate, practically all of those using resection agree that it has a definite place in the treatment of carcinoma. The cancerous encumbered urethra may be resected as the obstruction tends to reform, with a minimum of shock to the patient and without increasing the chances of cancer dissemination as when an attempt is made to remove the growth by radical surgery. This procedure places the bladder at rest and retards the lymphatic involvement which frequently is a part of the picture. We are greatly indebted to Caulk, Davis, Bumpus and others for perfecting these transurethral procedures and pointing out their clinical application in bladder neck obstructions. Caulk reports that 72 per cent of his cases were completely relieved by the punch operation and that 80 per cent may be accurately diagnosed from tissue thus removed. Resection may thus obviate the necessity of an exploratory biopsy for diagnosis. Ballenger combines the intra-urethral method with transvesical resection in malignant carcinomas too large for intra-urethral resection alone. McCarthy says: "It seems that all cases are susceptible to the amelioration afforded by either resection or the combined operation as advocated by Ballenger." Alcock has resected over 100 cases of prostatic carcinoma and much prefers it to surgery and advises preliminary deep x-ray. Smith says if the bladder base is involved, resection does not work well, and advises the use of deep x-ray therapy. Engel resected thirty-four cases of carcinoma of the prostate with but one death. He follows this procedure with high voltage roentgen therapy or radium implantation. Herman and Greene say that "Palliative resectoscopy has proven the first completely satisfactory method of overcoming prostatism due to carcinoma." Colston reports thirty-seven punch operations for carcinoma of the prostate, and says:

"With the perfection of the newer intravesical procedures, it will undoubtedly be found that a large proportion of malignant obstructions may be relieved by some one of these procedures."

The high frequency current used in resection, possibly due to the heat generated, has acted as an inhibitory agent on the growth in some cases. Palliative cystotomy with its attendant hardships on the patient is left for those hopelessly bed-ridden individuals who have marked vesical involvement with tenesmus and hematuria. Advanced cases of carcinoma with marked

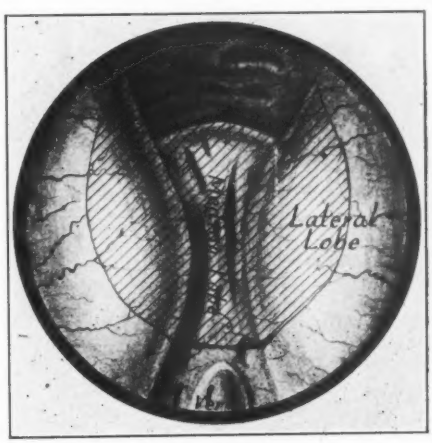

Fig. 6
Cystoscopic view of the neck of the bladder in an actual case of malignancy. Note the encroachment of the lateral lobes with elevation of the median lobe.

SUMMARY RECENT CASES OF PROSTATIC CANCER

Name	Age	Duration of Disease	Chief Symptoms	Type of Growth Metastasis	Amount Residual Urine	Type of Carcinoma	Deep X-Ray Treatment	Resection or Operation	End Result
Mr. J. O'C. 12/21/32	71	3 years	Hematuria; dysuria; finally retention	Intravesical growth seminal vesicles, associated hypertrophy	Acute retention	Adenocarcinoma Grade III	Following suprapubic; no relief of pain; pall. cystostomy	Palliative cystostomy, terminal stages	Died in 6 months of cachexia
Mr. W. T. 6/23/32	68	6 months	Nocturia; hematuria; dysuria	Intravesical clavicle; asso. hyper.	150 c. c.	Adenocarcinoma Grade III	After operating sections positive	Suprapubic prostatectomy 3 years ago, later resection	Died 18 months after resection
Mr. C. W. M. 2/4/33	61	2 years	Frequency; difficulty starting and stopping urination	Cancer of nipple, right; no bony metastasis; assoc. hypertrophy	90 c. c.	Adenocarcinoma Grade III	Before and after resection	Resection; later supraprostatectomy	Lived 18 months following resection; died 8 wks. after prostatect'my
Mr. E. M. 10/31/32	68	2 years	Nocturia; frequency	Associated adenoma	Acute retention	Adenocarcinoma Grade II	After operation	Prostatectomy; later resection	Living; no recurrence; voids without difficulty; no retention.
Mr. W. D. G. 4/29/32	66	2 years	Inability to void	Associated benign hypertrophy	Acute retention	Adenocarcinoma Grade II	After resection	Suprapubic prostatectomy; 2-punch resection	Living; no recurrence; voids normally; no reten.
Mr. W. B. S. 1/26/33	72	18 months	Diminished caliber; dysuria	Papillary adenocarcinoma; bladder tumor	180 c. c.	Carcinoma Grade II	None	Cystostomy; later resection	Living
Mr. J. G. A. 11/10/32	72	6 months	Nocturia; dribbling hematuria; dysuria	Spine, sacrum, ilium	200 c. c.	X-ray diagnosis metastasis	Section negative; none	Suprapubic prostatectomy; dilatation; resection	Living; very advanced metastasis
Dr. J. M. R. 11/16/32	56	3 months	Rectal suprapubic dysuria; pain; obstipation	Sacrum, spine, ilium	100 c. c.	Rectal growth metastasis	None; refused	Refused treatment	Living; advanced metastasis; marked cachexia
Mr. W. J. H.	67	6 months	Acute retention; pain in legs		Complete retention	Adenocarcinoma Grade III	Postoperative	Two-stage prostatectomy	Died in 6 weeks
Mr. J. W. 2/4/32	82	2 years	Inability to empty bladder; pain	No bony metastasis	60 c. c.	Prostate very hard and nodular cachexia	None	Dilatation; resection	Died in 18 months
Mr. C. L. 6/12/33	60	4 months	Severe dysuria; nocturia; frequency	Involvement bladder base; bone metastasis ilica	80 c. c.	Adenocarcinoma Grade III	None	Suprapubic cystostomy (palliative)	Died in 3 months

Name	Age	Duration of Disease	Chief Symptoms	Type of Growth Metastasis	Amount Residual Urine	Type of Carcinoma	Deep X-Ray Treatment	Resection or Operation	End Result
Mr. W. T. P. 3/23/33	74	2 years	Frequency; dysuria	Pubic bone metastasis	180 c. c.	Adenocarcinoma Grade III	None	Resection	Living, working, well
Mr. VanS. 4/10/33	64	6 months	Acute retention	Associated hypertrophy	Complete retention	Adenocarcinoma Grade III	None	Resection	Died in 6 months
Mr. W. H. 6/23/33	64	18 months	Dysuria; frequency; nocturia; hematuria	To bladder; papillary carcinoma bladder	130 c. c.	Papillary adenocarcinoma, Grade III	None	Palliative cystot. due to extreme tenesmus and involvement of base of bladder	Living. Gained weight
Mr. C. W.	68	3 years	Extreme dysuria	Bladder	380 c. c.	Prostate very hard fixed, involv. semi. vesic.	None	Suprapubic palliative cystotomy	Lived 6 mos. Died of cachexia; refused resection
Mr. J. Y. 1/7/33	76	4 years	Nocturia; painful and frequent urination; pain back and legs	Assoc. vesical stone	400 c. c.	Prostate very hard fixed, nodular; bladder neck contracted	Yes	Palliative suprapubic cystostomy	Died in 3 mos. of extreme cachexia, loss of weight, impairment

toxemia frequently show improvement after drainage is instituted, so that free bladder drainage should be provided even in these hopeless individuals. They are made more comfortable and require less care. The most alluring of practices is the nursing of hobbies. We should detach ourselves from pride of procedure or prejudice as to the method and remember our vocation is salvage of human life and alleviation of physical distress (McCarthy). In other words, fit the treatment to the disease rather than the disease to the treatment.

I wish briefly to summarize six unusual cases occurring in a group of seventeen carcinomas recently seen by the writer:

Mr. J. G. A., aged 64, had a suprapubic prostatectomy performed January 30, 1931, with a complete functional recovery. Clinically and microscopically the growth was benign. A flat plate showed no metastasis. However, during November, 1932 (twenty-two months later) he began to suffer from severe pain in the legs and back. A roentgenogram at this time showed the typical osteoplasia of carcinoma of the prostate in the lumbar vertebrae and sacrum. Because of the urinary retention, resection was performed successfully. Although entirely relieved of his urinary retention, he has gradually lost weight and shows evidence of metastatic toxemia. Deep x-ray therapy was used to control the metastatic pain.

Mr. W. T., aged 65, entered the hospital October 5, 1930, with an acute retention of urine. A one-stage prostatectomy was performed successfully October 18, 1930. Three weeks later he left the hospital cured. Tissue sections disclosed benign hyperplasia. Rectal palpation had disclosed a symmetrical soft hypertrophy. The roentgenogram was also normal. Sixteen months

Fig. 7
X-ray of the pelvis showing prostatic calculi which may be confused with a malignancy due to the irregular hardness of the gland from the calcium deposits.

later, February 2, 1932, I was again consulted by the patient for hematuria, dysuria and pain in the lower back. At the left sternoclavicular articulation an elevated mass 1x3 cm. was noted. It was firm on pressure and very tender. The Kahn test was negative. The blood picture was normal, except that a marked secondary anemia was noted. He had lost twenty-two pounds weight and was very weak. A cystoscopy showed fixation at the neck of the bladder with infiltration of the trigone by a nodular flat mass. Rectal examination revealed a very hard, irregular, fixed nodule corresponding to the vesical protrusion. Resection was done to relieve the residual urine and tenesmus. He left the hospital at the end of a week voiding well, with 10 c. c. of residual urine. Evidence of carcinomatosis was marked, and he died four months later from malignancy. There were marked gastric symptoms present at the end, probably metastatic from the prostate as was the clavicular involvement.

These two cases undoubtedly were part of an early carcinomatous invasion of benign tissue and were possibly overlooked on microscopic section. There were probably a few malignant cells embedded in benign tissue. Hirsch, Schmidt and Shaw have also reported similar cases. Also many borderline cases are prostatectomized in which small precancerous lesions, atypical cellular hyperplasia, actually are shown on section and if allowed to remain may become definitely malignant. Bugbee reports seven cases of this type. I wish to add two similar cases in which prostatectomy had been performed over five years ago, for clinically benign growths, found on tissue section to contain small areas of malignancy in the lateral lobes. Both patients are living and free from recurrence at this time.

A third case, Mr. W. D. G., aged 68, was first seen April 25, 1932, with complete urinary retention. A prostatectomy had been performed unsuccessfully elsewhere in November, 1931, for acute urinary retention. Sections made at that time showed adenocarcinoma. Two subsequent punch operations by the same surgeon failed to relieve the complete retention of urine. Intermittent catheterization has been practiced since that time. After preliminary preparation 11 grams of carcinomatous tissue were removed by resection, which entirely relieved the retention. For the past twelve months he has been able to void normally, has only 10 c. c. of residual urine and has gained fifteen pounds in weight with no further recurrence.

Mr. W. H., aged 63, was seen April 10, 1933, with partial retention of urine and gross hematuria. Cystoscopic examination showed a typical papilloma of the trigone, necrotic in the center and infiltrating the bladder wall. The base of the bladder was fixed and edematous and the cystoscope could be introduced only with great difficulty under sacral anesthesia. The prostate was soft, somewhat enlarged, not fixed and no nodules were present. The papilloma was removed by resection and microscopically showed a papillary adenocarcinoma of the bladder with metastasis from the prostate, the bladder tumor containing prostatic tissue. Because of the unbearable tenesmus, I was forced to do a palliative cystotomy, at which time a large indurated mass was found involving the posterior wall of the bladder. Major Dart, of the Army Medical Museum, after study of the several sections, said this represents a primary metastasis from the prostate to the bladder and is a Grade III papillary adenocarcinoma of the prostate.

This was interesting in that a papillary tumor was produced in the bladder from an apparently benign prostatic hypertrophy.

Dr. R., aged 55, was seen for the first time in July, 1932. There was a history of nocturia with difficulty in starting and stopping the urinary stream beginning eight months ago. These symptoms had gradually increased in severity. Rectal examination revealed a hard, irregular, nodular mass involving the prostate and seminal vesicles. There was an annular ring extending around the rectum arising from this growth and almost completely occluding the lumen of the rectum. A flat roentgenogram showed osteoplastic metastasis to the sacrum and ilia. Cystoscopic examination showed an indurated bladder neck with moderate protrusion of the median lobe of the prostate. There were 60 c. c. of residual urine. Dr. W. A. Frontz saw this case in consultation, confirmed the diagnosis and said this rare form of prostatic invasion to the rectum had been seen only once at the Brady Institute. The patient has lost fifteen pounds in weight and has gradually become weaker. Because recently there has been a marked diminution in the caliber of the urinary stream with increasing nocturia, a resection has been advised for the relief of the urinary retention with deep x-ray for the metastatic pain. Also a routine cecostomy is contemplated as soon as the rectum becomes completely occluded by the malignant growth.

The remaining eleven cases are summarized in the appended table.

SUMMARY OF TREATMENT

The treatment of prostatic malignancy consists in the radical procedures of prostatectomy with radium implantation and x-ray radiation of the prostatic region when the growth is confined to the capsule and when urinary obstruction is present. If there is no obstruction, radium implantation and x-ray radiation may be used. When the malignancy has extended beyond the prostatic capsule as has happened in the majority of cases when diagnosed, radical surgery rarely effects a cure and the procedure to be followed is either punching out or resecting the obstruction, this to be repeated as needed to insure the patency of the urethra. Radium and x-ray should be used to stop pain and bleeding. These agents will often retard the growth and cause a marked improvement in the patient's well being. Ballenger's method of combined suprapubic and intra-urethral resection is of great value in very large obstructions. Before any operative procedure is undertaken in carcinoma of the prostate, a preliminary radiological study

should be done, including (when necessary) cysto-urethrograms to determine the type of tumor, its location and extent, and whether metastasis has supervened.

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DISCUSSION (*Abstract*)

Dr. Raymond Thompson, Charlotte, N. C.—Dr. Stirling's statistics show that carcinoma of the prostate gland is a common condition rather than uncommon; it is much more prevalent than the medical profession as a whole would suspect.

Its incidence is so high that in all men of 50 or more who present themselves for examination, regardless of complaint or chief symptoms, the prostate gland should be examined. It is not difficult to determine whether the prostate gland is normal or malignant, or at least whether it suggests a malignancy.

Here, as in cancer e'sewhere, the greatest hope lies in an early diagnosis. Our percentage of malignancy in all cases operated upon at the Crowell Clinic, including over 600 cases by transurethral electroresection, is nearly 20, about the average reported by all clinics.

In the past the p'an of treatment was suprapubic drainage, radical surgery, x-ray and radium. During the past few years by the perfection of instruments for the satisfactory removal of vesical neck obstruction by Davis, Caulk, McCarthy, Bumpus and others, we are now able to give the patient suffering with carcinoma of the prostate gland relief of obstructive symptoms much more easily and more satisfactorily than before, and the electrical removal of the obstruction frequently retards the growth of the remaining malignant tissue. Our method of treating the ma'ignant prostate is by x-ray first and transurethral electroresection, followed by x ray and further resection if necessary.

KRUKENBERG TUMOR OF THE OVARY*

REPORT OF THREE CASES

By C. J. ANDREWS, M.D., F.A.C.S.,
Norfolk, Virginia

A certain amount of information about ovarian tumors is acquired by every student of medicine even before graduation. During the course of practice, if one's work leads in that direction, this knowledge is normally increased by personal observation and through the literature which records the experience and studies of others. In the common types large numbers of cases may be observed and justifiable deductions made. There are certain rare tumors which many of wide experience never see, and no one will see sufficient numbers to draw conclusions. The other source of knowledge, the literature, depends entirely upon the valuable reports and studies which have already been made. It is with the hope of contributing some small bit of material for the study of a rare and fatal disease that I submit the records of three cases of Krukenberg tumor.

This tumor was first described by Friedrick Krukenberg in 1896. He called it "Fibro sarcoma ovarii mucocellulare (carcinomatodes)," but it is commonly known as Krukenberg tumor. This is a solid ovarian tumor, usually bilateral and free of adhesions except in its late stages; the original contour of the ovary is maintained and the surface is of a pale gray

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color. The sense of weight on handling is very striking. Ascites is usually present. The microscopic picture is that of a dense, fibrous tissue, in the meshes of which are the characteristic cells, which appear as vacuoles, the nuclei being displaced eccentrically, giving the signet ring appearance. Some areas show these cells in abundance, and in others the fibrous tissue predominates. Krukenberg believes this to be a connective tissue growth, but it is now generally recognized as carcinoma.

Since 1896, a number of papers with reports of cases have appeared on this subject. Major, in 1918, collected fifty-five cases, including one of his own. Fallas, in 1929, collected twenty-three additional cases, including two which he reported. Hundley, in 1930, brought the number to one hundred and two, and since that time three cases have been reported in American literature and ten in foreign journals. This brings the total number of reported cases to one hundred and eighteen, including my three cases.

It is apparent that recognized, or reported cases, of Krukenberg tumor are still comparatively rare, though sufficient numbers have been reported to remove it from the curiosity class. In fact, one might now suspect that it is much more common than previous records would indicate.

Krukenberg believed this growth to be primary; abundant evidence has since shown that the great majority of these tumors are secondary to carcinoma elsewhere, usually of the stomach, intestines or breast. Ewing is inclined to believe that all true Krukenberg tumors are secondary. One of my cases may possibly prove to be a primary growth.

Rohdenberg analyzed five hundred cases of tumor of the ovary and found three Krukenberg tumors, or 0.6 per cent. Krukenberg said even though the form of the tumor described here does not seem to be at all rare—in the course of five years six cases were observed—he could not find in the literature a single case which could be said with certainty to agree with the description of this tumor. He does mention a number of cases described by various authors which are probably the same as he describes.

DESCRIPTION OF CASES

Case 1.—A woman, aged forty-five, married, with two children, the youngest aged nineteen. Three abortions had occurred after the last labor. This patient was first seen September 18, 1931. The chief complaint was excessive menstrual flow for the past year, becoming worse recently. There was a history of digestive disturbances over a period of one year or more. She had lost 39 pounds during the previous year. Pelvic examination showed the uterus slightly enlarged. Masses on either side of it felt like fibroids. The abdomen evidently contained some fluid. The ankles were swollen. Medical study had been made by Dr. W. B. Martin, who reported the absence of hydrochloric acid in the stomach; a moderate degree of secondary anemia; and hemoglobin 60 per cent. Gastro-intestinal x-ray revealed no abnormality. An x-ray of the gall-bladder after oral administration of dye showed normal filling and emptying. No other abnormality was found. About one year before this, the patient had a complete study of the gastro-intestinal tract in another city, without positive findings. On September 9, nine days after my first examination, the ascitic fluid had increased to such an extent as to embarrass respiration. The abdomen was tapped and five quarts of brownish fluid were removed. On October 1, a diagnostic dilatation and curettage were done. A small amount of endometrial tissue was removed. A low mid-line incision was made. Both ovaries were much enlarged, the left being larger than the right. There were no adhesions. The surfaces of the ovaries were smooth. The consistence of the tumors was very firm and gave the impression of weight on handling. In fact, they felt almost like lumps of lead. The appendix was thickened, hard, and adhered to the cecum. Palpation of the abdominal viscera showed no other evidence of disease. The pathological report by Dr. L. J. Motyca was as follows:

The left ovary is 80 x 55 x 35 mm. It resembles a small kidney in size and form. It is pinkish-gray in color, firm in texture, and contains small degenerative cysts. The tissue is edematous.

The right ovary measures 70 x 50 x 35 mm. It is similar to the left, but is slightly smaller.

The appendix is 80 x 10 mm. The appendix is thick, slightly congested and the cut surface contains much mucus. The lumen is small.

Microscopic Examination.—Sections from the two ovaries are essentially alike. There is an abundance of connective tissue stroma which is arranged in bundles

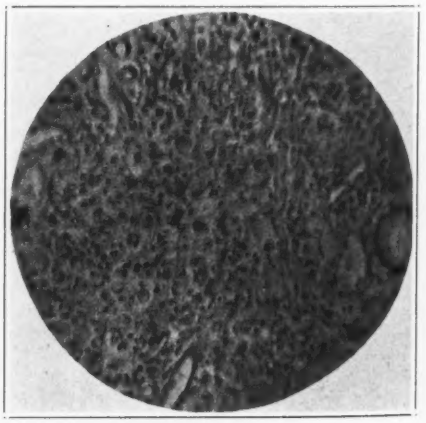

Fig. 1
Section of mucous membrane of stomach. Case 1.

Fig. 2
Section of ovary. Case 1.

and whorls. It contains numerous oval vesicular nuclei which contain deeply stained granules. These cells give the tumor the appearance of a fibrosarcoma, but there are other peculiar cells which are distended with droplets of mucin. The latter cells are not very numerous and they occur singly, in small clumps and in short strands. They stain more deeply than the fibroblasts. Mitoses are fairly numerous. In some areas there is a preponderance of mucoid connective tissue with no tumor cells and a few fibroblasts.

The diagnosis is carcinoma, Krukenberg tumor.

The appendix shows edema, moderate fibrosis and a moderate infiltration of eosinophils and round cells. The serosa, the muscular layers and the outer portion of the mucosa contain small clumps of mucin-containing cells like those of the ovaries. The outer muscular layer and the serosa show most infiltration. There is little lymphoid tissue in the mucosa.

The diagnosis is carcinoma of the Krukenberg type.

About two weeks after the operation the abdomen again filled and again was tapped. This fluid showed characteristic mucous cells.

The patient was readmitted February 2, four months after operation, and died February 3 of intestinal obstruction. The autopsy report by Dr. L. J. Motyca is as follows:

The peritoneal cavity contains about 500 c. c. of cloudy serous straw-colored fluid and large sheets of fibrin which are loosely adherent to the peritoneum. There are many small pink nodules in the visceral and parietal peritoneum. The latter is also congested. The adhesions between loops of bowel are fibrinous, and they are easily broken.

The anterior and posterior walls of the stomach, along the lesser curvature, show a marked thickening (10 to 20 mm). This area extends 100 mm. along the lesser curvature and about 50 mm. downward along the anterior and posterior walls. The tissue is hard and nodular. The mucosa is slightly hemorrhagic, but not definitely ulcerated. There are no masses projecting into the stomach.

The intestines are congested and covered with a fibrinous exudate. The peritoneal coat contains many small hard nodules which are not encapsulated. The wall of the bowel is only slightly thickened. The mesenteric lymph nodes are slightly enlarged. The appendix is missing. Loops of the intestine are firmly adherent at each cornu of the uterus.

Microscopic Examination.—Parts of the mucosa and wall of the stomach are packed with moderate to large epithelial cells which contain droplets of mucus. The nuclei are fairly large in size and have been pushed to one side by the mucus. Some of them are shaped like a crescent. There are relatively few mitoses. The cells are scattered in a delicate reticulum rather than being in close approximation. There is much fibrous tissue between the muscle and peritoneal coat. The muscle itself contains areas of fibrosis. These fibrous areas contain plasma cells, lymphocytes, eosinophils and many tumor cells. The latter are similar, but smaller than those found in the mucosa. The fibrous tissue is responsible for most of the thickening of the stomach wall.

The diagnosis is carcinoma, Krukenberg tumor.

The serosa, muscular layers and the muscularis of the small intestine are infiltrated with small islands of epithelium and also single epithelial cells. These tumor cells are of the same type as those found in the stomach, but show a tendency to form small irregular groups, some of which contain large globules of mucus. Many of the single tumor cells contain smaller droplets of this substance. Few mitoses appear among the tumor cells. Some areas contain a moderate infiltration

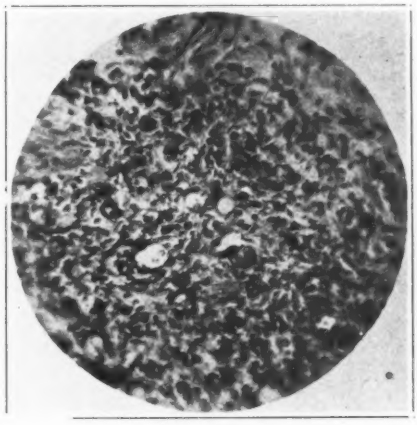

Fig. 3
Section of appendix. Case 1.

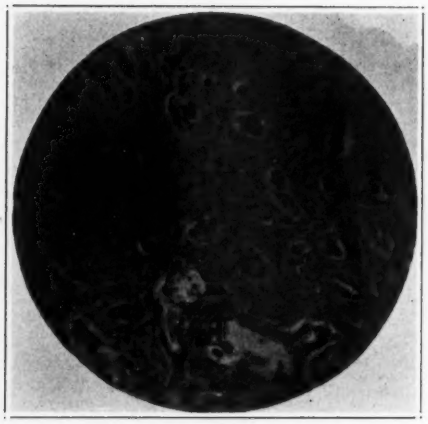

Fig. 4
Section of ovary, signet cells and alveoli. Case 2.

of lymphocytes. There is much newly formed fibrous tissue between the peritoneum and muscular layers. Sections from the fibrinous exudate which was removed from the peritoneal cavity show neutrophils, lymphocytes and tumor cells enmeshed in fibrin.

The diagnosis is metastatic carcinoma, Krukenberg tumor.

The uterus showed no evidence of tumor growth.

Case 2.—A colored woman, aged 34 years, was admitted to the hospital April 8, 1933, through the outpatient department to the service of Dr. W. Arthur Porter, with symptoms of intestinal obstruction. Pains in the lower abdomen began about three weeks previously. These were attended by nausea, vomiting and absence of bowel movements. The patient was taken to the operating room at once. The peritoneal cavity contained free fluid. The ileum was bound down and obstructed by tumor growth near the ileocecal valve and the entire small bowel was distended. Carcinomatous nodules were found in the pelvic organs, the omentum, the mesentery and liver. An enterostomy tube was placed in the ileum. A section from one of the mesenteric glands revealed adenocarcinoma, Krukenberg type. The patient died two days later. The autopsy report by Dr. L. J. Motyca follows:

The mucosa and wall of the stomach show extensive infiltration by atypical alveolar glands, small islands of epithelium and single epithelial cells. The alveoli are moderate in size and they are lined with one or more layers of epithelium. The epithelial cells are fairly large in size and some of them are distended with droplets of mucus. The nuclei are large and deeply stained. The small groups of epithelial cells are large and round or polyhedral. Some of them contain large droplets of mucus which have pushed the nuclei to one side, giving a signet ring appearance. The single tumor cells are of the same type. Mitoses appear in moderate numbers. There is a moderate amount of fibrous tissue. Some areas contain an infiltration of lymphocytes and plasma cells. The alveolar structures are predominant in most fields. However, some fields contain only single and small groups of tumor cells, many of which resemble a signet ring. These cells are characteristic of the Krukenberg tumor. They predominate over the alveolar structures in most cases. Here we have a reversal of the usual picture.

The ileum presents a picture similar to that of the stomach, the only difference being that there is more mucus present in the tumor cells.

The bladder shows no evidence of tumor infiltration.

Both ovaries are about four times the normal size; they are hard, white and fibrous. The oviducts contain some hard, fibrous nodules. The same type of infiltration is found in both anterior and posterior walls of the uterus.

The diagnosis is Krukenberg tumors of both ovaries, stomach and ileum.

Case 3.—A woman of 50 years had been married 12 years, with no pregnancies. Her chief complaint was of pain and a feeling of pressure in the pelvis, with urinary frequency and a dull ache over the left kidney during the preceding several years, which had become progressively worse during the previous three months. Her periods were normal until six months before examination, and she had not menstruated since that time. There was no history of digestive disturbance. The pelvis contained a mass about the size of an orange.

She was operated upon May 11, 1933.

The pelvic mass was found to be globular and firm in consistency. It was attached to the bladder and other pelvic structures by adhesions. When isolated it was found to be a tumor of the left ovary. The uterus was normal and displaced to the right. The tubes were normal. The right ovary contained a small hemorrhagic cyst. A bilateral salpingo-oophorectomy and supravaginal hysterectomy were done. A small indurated gland was palpated near the pylorus of the stomach, but otherwise the abdomen was negative. A frozen section of the specimen was reported as adenocarcinoma. Later slides showed some areas containing signet ring cells.

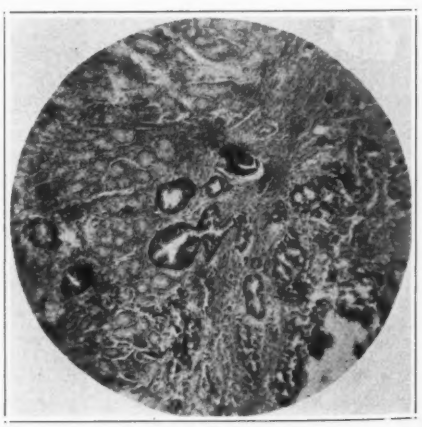

Fig. 5
Extension of carcinoma from mucous membrane to submucous wall. Case 2.

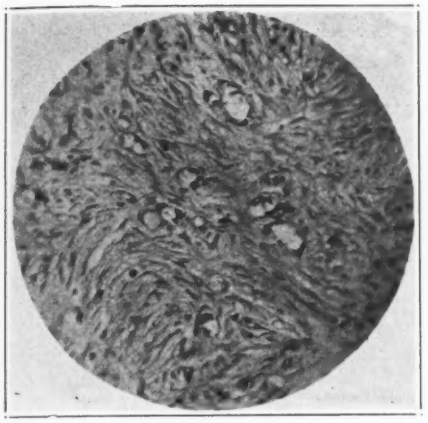

Fig. 6
Section of ovary. Case 3.

The pathological report follows.

The left ovary is 70 mm. in diameter. It is almost as large as a baseball. It is hard and nodular. The cut surface is grayish-white in color with extensive necrosis. The necrotic areas are yellow in color.

The right ovary is 30 x 25 x 12 mm. It is rather small and contains a small hemorrhagic cyst.

On microscopic examination, the section of the right ovary contains a small group of alveolar glands which are lined with ciliated columnar epithelium. The wall of these cysts contains large phagocytic cells which are filled with hemosiderin. These indicate old hemorrhage. The diagnosis is endometriosis of the right ovary.

Microscopic examination of the left ovary shows no normal ovarian structures in any of the sections. The bu'k of the tissue is composed of single or small groups of large round or polyhedral cells, scattered in a field of connective tissue which is chiefly of the mucoid type. Most of the tumor cells contain large droplets of mucus which have pushed the nuclei to one side into a signet ring form. They are intimately associated with the mucoid connective tissue stroma. The cells of the latter are either stellate or fusiform. One section shows a second type of epithelial tumor which is distinctly alveolar. The alveoli are moderately large and they are lined with one or more layers of columnar epithelium. The epithelial cells stain deeply with hematoxylin, and many of them contain small droplets of mucus. The alveoli form a distinctly minor part of the tumor. Some portions of the tumor have undergone coagulation necrosis. Others contain a moderate infiltration of lymphocytes.

The diagnosis is Krukenberg tumor.

In the uterus there is no evidence of malignancy.

A uterine polyp contains cystic glands which are lined with low columnar epithelium. This is surrounded by edematous stroma. The endometrium also contains cystic glands which are smaller in size. The diagnosis is benign polypoid lymphoplasm.

On May 27, 16 days after the operation, an x-ray study of the gastro-intestinal tract was made. No abnormality was demonstrated. On September 21, this patient was examined by Dr. E. Novak, who had x-ray made of the chest, heart and gastro-intestinal tract. The reports were negative except for spastic colon. She continues to be free of any symptom of disease.

DISCUSSION

Cases 1 and *2* represent different stages of secondary growths. Attention is called to the fact that in *Case 1* no growth of the stomach could be palpated at operation and at autopsy several months later the growth could be located only by careful inspection. Major's case required serial sections of the stomach to identify the growth.

The appendix showed macroscopic and microscopic evidence of a similar pathologic condition, and it was my hope at the time of operation that this was the original source of the tumor cells. These cases were clinically associated with symptoms of digestive disorders or disease of the gastro-intestinal tract. Both of these cases represent typical Krukenberg tumors, the growth having been demonstrated in the stomach, ovaries and other structures. Both were bilateral and associated with ascites. The tissue showed characteristic signet ring cells with fibrous stroma.

The third case is a different picture. The history reveals no evidence of digestive disorders. The growth is unilateral; no other primary growth has yet been found. The microscopic slides show signet cells and fibrous tissue in some areas; in others this shades into fairly typical adenocarcinoma. This, as well as *Case 2*, shows the close association with adenocarcinoma. In *Case 2* the adenocarcinoma predominates, and in *Case 3* the Krukenberg tumor is more prominent.

Case 3 is living and in good health six months after operation. X-ray study recently made shows no evidence of the disease. This is not convincing, as it is not likely that x-ray would show any evidence in a specimen which might require serial sections to locate.

It is of interest to note the varying views as to the avenues by which the tumor cells reach the ovaries in known secondary cases. Direct transplantation of the cells through the peritoneal cavity to the surface of the ovaries has been suggested. Since these mucous cells are found in the ascitic fluid, as in my *Case 1*, this would seem very easy, and undoubtedly does occur, at least in the later stages when deposits are found through the peritoneal surfaces. The

blood stream is also thought of. Major's case showed metastases in the lung and is believed to be an instance of this. The lymphatic route is generally credited with being the most common, and this would seem to be consistent with the bilateral involvement. Evidence of entrance of cells through the hilus of the ovary rather than the cortex and might explain the early appearance of ascites from blockage of lymphatic channels.

Case 3 had an endometrial cyst of the other ovary. Sampson found this in four of seven cases of adenocarcinoma of the ovary, and derives them both from endometrial implants. If there were no objections to this theory it would provide a satisfactory explanation of the origin and mode of transmission in this case.

It is unfortunate that there is nothing characteristic in the early clinical picture. A study of the histories which I have had the opportunity to examine would indicate that most, if not all of these, have been seen first as terminal conditions. Indigestion has marked the early history of some.

My *Case 1* had been exhaustively studied one year before on account of symptoms believed to be referable to the digestive tract. This study was repeated a short time before operation, without positive findings. Menorrhagia has been noted in some, and was the immediate need for treatment in *Case 1*. It is surprising that abnormal bleeding is not more frequently present, since cancerous growths of the ovary are the cause of even postmenstrual bleeding.

Local pelvic symptoms have been the first subjective evidence in many instances. When ascites appears the process is well developed, though it is the first recorded symptom in a number of cases.

The diagnosis is suggested at the time of operation by the physical characteristics of the organs. The mucous cells seen in the microscopic slides confirm the diagnosis.

The treatment of this, as well as other malignant conditions, is more successful before the development of the cancer. This no doubt is being constantly accomplished by the excellent work which is being done in early removal of breast, stomach and other abnormal growths. The prompt and early removal of ovarian tumors may prevent the development of the primary ovarian lesions. Routine pelvic examinations may do something to promote this result. The need for a thorough pelvic examination as a part of a diagnostic survey of women is apparent.

The early diagnosis of the primary lesions in the stomach seems a most difficult task, since it has been shown that the x-ray, so commonly relied on, is not sufficient.

There is some difference of opinion as to the treatment of other pelvic organs when a Krukenberg tumor of the ovary is removed. Practically all cases reported in the literature are simply accounts of a terminal condition, and certainly under such circumstances the removal of the genital organs should be looked upon as palliative only.

H. O. Newman, quoted by Jarcho, says that during operation for ovarian carcinoma search must be made for primary carcinoma in other organs, which if found must be removed. Attention is also called to the advisability of examining the ovaries when removing gastric carcinoma, since 2.3 per cent of gastric carcinomas metastasize in the ovary.

According to Schauta, if this operation discloses ovarian tumors, the uterus and adnexa must be removed, since metastases along the lymphatics occur earliest in the genital organs.

If the ovary contains the only metastases in a given case of carcinoma of the stomach, removal of both cancers would seem to be indicated and to offer some hope, and certainly would be the only help available.

Jarcho found in his case that when the growth extended to the uterus the urinary bladder wall was also involved and concludes that hysterectomy is not indicated, or is useless. In neither of my cases was infiltration of the bladder present, though in one case the uterus was involved.

I have not been able to find a single case of Krukenberg tumor which is known to have recovered permanently.

SUMMARY

Three cases of Krukenberg tumor are reported; two advanced secondary cases, both bilateral. The microscopic appearance of tissue in the stomach, ovaries and other growths are similar.

In one case the appendix was also involved.

A third patient with a unilateral tumor is still living and well, and the case may prove to be primary.

Some clinical and pathological features are discussed.

The close relationship between adenocarcinoma and Krukenberg tumor is emphasized.

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DISCUSSION (*Abstract*)

Dr. Emil Novak, Baltimore, Md.—While Krukenberg tumors have received considerable attention in the literature, there is still much haziness as to their nature and characteristics. They are of moderate size, they retain the ovoid or kidney-shaped outline of the ovary, they are most often bilateral, they are well encapsulated, they present a characteristic variegated cut surface, with often areas of myxomatous or colloid appearance, and, microscopically, they are especially characterized by the peculiar "signet cells." The latter are identical with those seen in mucoid adenocarcinomata of the gastro-intestinal canal, so that the Krukenberg tumor is not infrequently or inappropriately spoken of as "carcinoma mucocellulare."

Dr. Andrews has discussed quite fully the question of whether or not these tumors are invariably of secondary type. That most frequently they are admits of no doubt, and most often the primary tumor is in the stomach, intestinal canal, or gallbladder. It should be remembered, however, that not all ovarian tumors secondary to gastro-intestinal cancer are of the Krukenberg type, for the ovarian lesion is often of the ordinary adenocarcinomatous pattern. We have been much interested in this aspect of the problem and, from the study of a considerable number of these secondary tumors in our laboratory, are strongly inclined to believe that it is the mucoid or colloid gastro-intestinal cancer which, when transplanted to the ovary, produces the characteristic Krukenberg tumor. We are planning shortly to publish our studies of this group of cases.

With reference to the route of metastasis from the stomach or intestine to the ovary, I have always been skeptical of the prevailing theory that cancer cells from the upper abdominal lesion "fall like snow flakes" through the abdomen and plant themselves on the ovary. For example, there is no surface growth of cancer in such cases, for they are smooth and encapsulated. Many other additional reasons, which I presented in a paper published several years ago, impel me to believe that the route is a lymphatic one, as with cancer in general.

Dr. M. Pinson Neal, Columbia, Mo.—A word of caution is needed relative to the comparison of statistics of the past few, or even twenty years, with those prior to 1910, and especially to 1900. The essayist has compared statistically the relation between gastric adenocarcinoma and the ovarian Krukenberg tumor. The term adenocarcinoma is used loosely today for glandular cell carcinoma in which gland-like structures are present. This is not the use for which the term was coined, nor for which it was generally used for years, and for which it is still used by some pathologists. The term "adenocarcinoma of the stomach" as originally used is not at all the adenocarcinoma of the stomach as now diagnosed. Statistics then based on the use of this term for critical points are not of great significance.

The original Krukenberg tumor was termed "fibrosarcoma ovarii mucocellulare carcinomatodes." The ovoid signet ring-like cells and the histology of the tumor, which are the characteristic features, do not suggest adenocarcinoma (malignant adenoma) to those of us who adhere to the original usage of that term. In even the metastases of the gastric adenocarcinoma, the more or less typical glandular structure of the gastric glands is maintained. The histologic malignant features are determined by: (a) finding these glandular structures in the muscularis mucosa, serosa, and as metastases in lymph nodes, peritoneum, ovaries, and so on; (b) their invasive peripheral and destructive growth. It is very refreshing to a pathologist to hear the familiar usage of these terms by Dr. Novak as we were taught them by the old masters.

Dr. Andrews (closing).—Dr. Donald Miner in 1926 reported a case of primary Krukenberg tumor which was alive at the end of one year. About a month ago I wrote him asking if this patient were still living. He said that she was and in good health, but in view of these facts he would again have the slides studied. He later wrote that since the patient had done so well, the pathologists had changed their minds and expressed the opinion that it was not a true Krukenberg tumor.

I am very much interested in the pathology of this condition, but more interested in the clinical side of it and am very anxious to hear of a case which has recovered.

THE USE OF GOLD SODIUM THIOSULPHATE IN THE TREATMENT OF LUPUS ERYTHEMATOSUS*

By HOWARD KING, M.D.,
and
C. M. HAMILTON, M.D.,
Nashville, Tennessee

This article is based on a review of recent literature and experience obtained in treating forty-six cases of lupus erythematosis.

Gold compounds were employed in the treatment of tuberculosis as early as 1810, but its use was shortly discontinued for almost a century. Soon after discovering the tubercle bacillus, Koch found that gold compounds had a high bactericidal action upon this organism. This gave impetus to further experimentation. In 1913, Bruck and Glück contributed to its revival by the intravenous administration of potassium gold cyanide in lupus vulgaris. They were favorably impressed with changes in the cutaneous lesions, but complete regression was not effected. The same year, Ruete obtained fair success with potassium gold cyanide in lupus erythematosus, but its use was soon discarded on account of the toxicity. Interest in gold therapy has increased rapidly since that time. German observers were pioneer investigators both in the treatment of tuberculosis and lupus erythematosus. In 1922, Martenstein reported 66 per cent cures in forty-two cases of lupus erythematosus.

In 1924, Móllgaard, of Copenhagen, perfected a compound known as sanocrysin. prepared by the action of thiosulphate acid upon gold. A chemical study of it had been made as early as 1845, but this seems to have been the first record of its therapeutic use. It was first employed in tuberculosis. A solution of 1:1,000,000 will restrain the growth of tubercle bacilli.

In 1926, Schamberg and Wright introduced gold sodium thiosulphate in the treatment of lupus erythematosus in America. Throne and his co-workers also began the use of gold compounds in 1926. After animal experimentation with three gold compounds; gold sodium thiosulphate, krysolgan (a proprietary gold sulphur benzol derivative, $NH_2C_6H_3$ [S. Au] COOH), and triphal (the sodium salt of aurothcobenzimid azolcarbonic acid) it was concluded that triphal was the least toxic.

The advent of gold therapy marked the beginning of one of the greatest eras in the treatment of cutaneous diseases. While the method is neither perfect nor free of danger, the utter hopelessness that was formerly experienced has been dispelled. Real benefit is accomplished. A refractory task has been replaced by a pleasing undertaking.

This series was started in May, 1927. A white woman, forty years of age, who had had discoid lesions on her nose and the sides of her face for two years, presented herself for treatment. She had received several applications of radium. Prompt disappearance of the thick keratosic lesions from injections of triphal lent encouragement to the use of this agent.

There were nineteen males and twenty-seven females in this series. Seven of them were negroes. The average age was thirty-nine, the youngest twelve and the oldest seventy-six. The average duration was approximately nineteen months.

Ten of the cases belonged to the chronic disseminated type. Thirty-five cases had discoid lesions and only one was classified as acute fulminating disseminated erythematous lupus. Three of the seven negroes had chronic disseminated lesions. Several failed to receive a sufficient number of injections to produce satisfactory results. Some showed immediate improvement, but for unknown reasons did not return for regular treatment. Others in remote localities were seen infrequently. Therefore a selection of thirty-six cases that received a thorough course of treatment with whole-hearted cooperation offers a more accurate basis for comparative study.

Triphal was employed in the beginning, but the majority of the cases have had gold sodium thiosulphate. No difference in the efficacy of the two compounds has been recognized. An initial dose of 50 mg. followed at weekly intervals by injections of 100 mg. has been the usual plan. Results have been obtained in most instances with twelve injections. The fewest number required has been six. Seventeen doses were the most any patient received in a single series. Two recurrent cases had a total of forty and forty-five doses, respectively.

There is a peculiar individual susceptibility to the toxic influence of gold compounds. Driver and Weller reported a fatality from a total of 75 mg. of gold sodium thiosulphate given in

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two injections of 25 and 50 mg. four days apart. On the other hand, a single injection of 1,500 mg. has been given without harm.

Successful treatment necessitates a painstaking examination for evidence of focal infection and tuberculosis. A careful history of pulmonary disease and scrofula is very important. X-ray and laboratory examinations are invaluable aids. From a review of this series of cases, focal infection seems to be a more frequent etiologic factor than tuberculosis. Several of the patients had oral sepsis and sinus trouble. Alveolar abscesses have been the most frequent focal involvement. Infection has been treated first when possible. Since extensive radical tooth extraction has been known to precipitate fulminating dissemination, conservative measures are advocated in dealing with teeth and sinuses.

A negro girl, nineteen years of age, with chronic disseminated lupus erythematosus was found to have septic gums and alveolar abscesses. A discharging sinus was connected with the apex of one of her teeth. Disregarding advice to consult a dentist, she reported week after week for injections of gold sodium thiosulphate, promising each time to see the dentist the following week. After four months of non-cooperation she left the city with no appreciable benefit. The treatment was interrupted near the end of the third month for two or three weeks by a mild dermatitis.

Another negro woman, thirty-three years of age, was seen May 28, 1930, with discoid lesions of the face, oral mucosa, and chest of ten months' duration. The response to gold therapy was very slow. After the fifth injection, alveolar abscesses were discovered, and following extraction of teeth, immediate improvement resulted in dismissal with the twelfth injection. December 21, 1931, eighteen months later, recurrent lesions were found on her face and again the response was retarded. After the seventh injection, dental films showed other teeth had peri-apical disease. Rapid recovery followed extraction and she was again dismissed after twelve doses of gold sodium thiosulphate.

The youngest case in this series was a negro girl, twelve years of age, presenting discoid lesions on her face of a year's duration. Tonsillitis, stomatitis, and alveolar abscesses were evident. The Wassermann test was negative. After tonsillectomy and the institution of dental and oral measures only six injections of gold sodium thiosulphate were required for complete relief. The injections were interrupted by a mild dermatitis which soon terminated, leaving a smooth, healthy skin.

In contradistinction to these cases, a white woman, thirty-six years of age, was seen August 1, 1933, with early involvement of both sides of her face. A complete regression of the lesions resulted from eight injections of gold sodium thiosulphate, although two alveolar abscesses were not treated.

Another white woman, 41 years of age, had discoid lesions of six months' duration, which appeared soon after illness for six weeks with influenza. Reddish painful nodes involved the anterior surfaces of her legs for four weeks during convalescence. Three weeks after this condition subsided the discoid lesions appeared on the face.

None of the cases in this series has had confirmed active tuberculosis.

A white woman, thirty-one years of age, with chronic discoid lesions of the face, suddenly developed an acute dissemination following an attack of fever, cough, and loss of weight. A clinical diagnosis of pulmonary tuberculosis was made, but x-ray examination disclosed a mediastinal mass without evidence of tuberculosis. She later developed a gallbladder infection and died from cholecystectomy.

A negro woman, aged twenty-five, with disseminated lesions involving face, oral mucosa, chest, legs, feet, hands and forearms for eight months may be of interest. For a year she had been troubled with cough, daily temperature, and loss of weight. From x-ray study and sputum examination, the clinical picture of pulmonary tuberculosis was interpreted as bronchiectasis. Extensive oral sepsis and alveolar abscesses were also present. After attention to the oral infection, the cutaneous and systemic symptoms began to subside with the first injection of gold sodium thiosulphate. A mild dermatitis occurred after the third injection, and treatment was suspended five weeks. With abatement of the dermatitis, the lupoid disfiguration continued to decrease. The cough became less frequent and a definite gain in weight and strength ensued. The patient was dismissed after receiving twelve injections of gold sodium thiosulphate, having gained 25 pounds in weight.

A white man of thirty-four, presenting early discoid lesions on the face, was first seen August 22, 1927. Eight months prior to this time he had consulted his physician, who suspected pulmonary tuberculosis. On several occasions small pulmonary calculi had been coughed up. X-ray examination disclosed multiple calcareous shadows in both hilar regions without evidence of an active process. He was a slender, highly nervous type of individual. He drank a pint of liquor every night as a somnifacient, and from this habit he could not be dissuaded. He was dismissed November 25, 1927, having had nine injections of triphal. On April 30, 1928, approximately seven months later, he returned with a recurrence. He was discharged October 21, 1928, after receiving ten injections of triphal. Twenty-two months later, August 18, 1930, a second recurrence was seen. On this occasion gold sodium thiosulphate was used and again the response was very satisfactory. September 25, 1933, almost three years after the last dismissal, a small active lesion was found on the side of his face. This lesion is showing prompt response to the fourth series of gold treatments within a period of six years.

A similar case was seen February 8, 1928. This was a white man, thirty-four years of age, who was also a slender, nervous person. Treatment was postponed until March 16, 1928, in order that he might have alveolar abscesses treated. Large hyperkeratotic discoid lesions were observed in each pre-auricular region. Seventeen injections of triphal were necessary for relief. May 20, 1929, one year afterwards, recurrence had taken place and twelve additional injections were necessary. He returned March 27, 1930, with his second recurrence and received eleven injections before being dismissed. He was seen November 8, 1933, and several keratotic discoid lesions were found on his nose, the sides of

his face, and his right arm. He says that he has had considerable trouble with his sinuses, but has not had any treatment. For a short time in December, 1931, he was confined to an institution with manic-depressive psychosis. He claims that the injections of gold were the cause of the "nervous breakdown," although more than eighteen months had intervened.

Only a few immediate reactions have been encountered. Two patients gave a history of having had a chill and an elevation of temperature about an hour after an injection of gold sodium thiosulphate by a local physician. With the exception of one case of acute fulminating lupus erythematosus, no immediate reactions have been recorded. On the other hand, a high percentage of dermatitis has resulted, occurring in six cases in this series. This may be due to the use of larger doses than are advocated by many. The rash has been much milder than that resulting from arsenicals, usually clearing up within three to five weeks. Sodium thiosulphate has been given to a few patients, but others seem to have done just as well without it. Patients who developed dermatitis apparently received the greatest therapeutic value from gold compounds.

A white man, forty-one years of age, who had had chronic discoid lesions on his nose, the sides of his face, and ears for two years, may be cited. A dermatitis resulted after the fifth injection and only two more were required for complete recovery. The twelve year-old girl already mentioned is another example.

A very striking illustration was a white man, forty-five years of age, with thick hyperkeratotic plaques on the face and scalp. Some of them were 3 or 4 cm. in diameter and had been present for a year. A dermatitis more severe than the average developed after the third week. The rash disappeared in five weeks and gold therapy was resumed. Two administrations of gold sodium thiosulphate caused a recurrence of the rash, which lasted only three weeks. Three more injections of gold resulted in complete regression. The character of the lesions would lead one to classify this case as a refractory type. Nevertheless, a total of eight injections produced the desired results.

The use of gold sodium thiosulphate in the following case of acute fulminating lupus erythematosus is interesting and may shed light upon an unsettled question.

A white man, seventy-six years of age, came to the office July 10, 1932. The sides of his neck and the backs of his hands and wrists presented discrete reddish papaques of six weeks' duration. There were pernio like cyanotic discolorations and edema on the sides of his feet and ankles. A diagnosis of pellagra had been made, but this diagnosis was rejected, since the lesions were characteristic of an acute disseminated lupus erythematosus. He insisted on going home after receiving 100 mg. of gold sodium thiosulphate, but returned July 17, one week later, with extension and exaggeration of the eruption. The soles and palms were edematous and disfigured with cyanotic patches. The tips of his fingers and toes were spotted with livid macules. The face, forearms, and legs were erythematous. The entire involvement had a peculiar cyanotic tinge. The mucous membranes of the mouth and the vermilion borders of the lips showed scattered silvery patches surrounded by a livid discoloration. The temperature was 102, pulse 80, and white blood count 4,800. The urine contained a trace of albumin. The acuteness of the eruption made it difficult to determine whether he had an acute fulminating lupus erythematosus or dermatitis from a single dose of gold. He was given daily injections of a gram of sodium thiosulphate, alkalies and fluids freely. Saturated boric acid dressings were applied to his feet, legs, hands, and forearms. Dobell's solution was used as a mouth wash. After he had followed this treatment for three days, a diagnosis of acute fulminating lupus erythematosus was made. He was given 60 mg. of gold sodium thiosulphate July 20, 100 mg. July 25, 29, August 2, 7, 14 and 21. He began to improve immediately. The first injection after admittance to the hospital caused a slight reaction and the temperature rose to 100° within two hours. The third injection caused a marked reaction and the temperature rose to 103.6° F. None of the other injections caused definite disturbance. The temperature remained normal after the sixteenth day, which was approximately nine weeks after the onset. He made a prompt recovery and remained well.

The following case is reported as an illustration of one of the dangers of gold therapy.

A white woman, married, thirty years of age, came to the office September 22, 1933, with discoid lesions on her nose, the sides of her face, neck, and upper sternal region of six months' duration. She had suffered with sinus infection for many years and with malaria at intervals most of her life. In the fall of 1932, she developed arthritis in her hands which improved after the antra were drained. The arthritis returned in February, 1933, and soon involved her elbows, shoulders, knees, and ankles. In an effort to clear up the acute arthritis, tonsillectomy, sinus drainage, vaccine therapy and other measures were tried without success. X-ray examination of the teeth was negative. The eruption appeared in March, 1933. Approximately three weeks prior to the initial visit, she had consulted a dermatologist in another city, who made a diagnosis of lupus erythematosus. He recommended gold therapy and advised that 10 mg. of gold sodium thiosulphate be given at five-day intervals by her local physician. Within an hour after the first injection she had a chill and high fever, which lasted for 24 hours. A similar reaction occurred after the second injection, five days later. In view of these reactions, conservative measures were thought best. In addition to the cutaneous lesions and a painful arthritis, an acute inflammatory condition was found on the mucous membranes of the mouth, which was diagnosed as Vincent's infection. The patient was placed in the hands of a consultant October 4, 1933. At this time the temperature was 102°, hemoglobin 50 per cent, red cell count 2,040,000 and white count 4,600. Blood culture was negative. The blood was also negative to ma-

laria and typhoid. Her condition gradually became more serious. The temperature varied from 100.6 to 104° F. until October 13, when she had a generalized convulsion and coma, terminating fatally in three days. During the comatose stage the temperature reached 106°, with normal respiration, pulse 110, and white count 4,000. The differential leukocyte count was polymorphonuclears 44 per cent, small lymphocytes 36 per cent, and large lymphocytes 20 per cent. The blood was still negative to malaria and to cultures for organisms. The urine showed a trace of albumin. X-ray examination of the chest was suggestive of miliary tubercu'osis. Before death the neck became rigid and retracted. A diagnosis of miliary tuberculosis with meningeal involvement was made. Only a partial autopsy was permitted and no evidence of miliary tuberculosis could be found. Although examination of the spinal canal and brain was not permitted, the clinical picture was that of a tuberculous meningitis.

Since it is known that gold compounds cause a focal reaction in tuberculous lesions, and since this case had chills and fever after each injection and died within six weeks from the time of the injections, the natural assumption is that the gold injections caused dissemination of tubercle bacilli, resulting in fatal meningitis.

SUMMARY

(1) Gold compounds have proven decidedly the most beneficial agent thus far employed in lupus erythematosus.

(2) Thirty of the thirty-six cases had satisfactory results, but perhaps some of these will have recurrence.

(3) With a single exception every case in this series obtained some improvement.

(4) Six patients had recurrence. Two of them have had three recurrences.

(5) Mildly acute lesions disappear more quickly than thick chronic lesions. Single isolated plaques are more refractory than multiple lesions.

(6) Focal infections seem to be both an etiologic factor and a therapeutic hindrance. Tuberculosis has not been an outstanding cause.

(7) Dermatitis has occurred in six cases. The patients who had dermatitis responded well to gold compounds.

(8) Gold therapy has been of value in one case of acute fulminating lupus erythematosus.

(9) Administration of gold compounds is not free of danger.

DISCUSSION (*Abstract*)

Dr. J. N. Roussel, New Orleans, La.—I gather that Dr. Hamilton considers gold the most effective remedy for erythematous lupus at this time available and that focal infections, if not of etiological import, are certainly a great hindrance to its cure.

The efficacy of gold in the treatment of erythematous lupus, in the words of the old patent medicine vendors, is so marvelous that "philosophical experts are confounded and the sceptics are left to wonder."

My own experience with gold in the treatment of erythematous lupus has not been very large, but it has been most satisfactory; suspiciously so, in fact.

Of fifteen cases, of which I have complete records, all are well. One had a relapse about a year after treatment and was given more gold until he cleared again; another was badly salivated after the eleventh dose, but finally cleared completely, and after five years is still apparently well.

At least 100 mg. per week is necessary for the cure of the average case, but I shall not quarrel with those who think otherwise.

I have been particularly fortunate in having a group of cases without complications of a serious nature. Two patients had infected teeth, which were removed before beginning treatment. This, I think, is very important and probably had much to do with smoothing the way for them.

While gold is remarkably effective in erythematous lupus, synergistic measures may be employed in a goodly number with advantage, and I assume that this is done when indicated.

Dr. Chas. O. King, Birmingham, Ala.—Until a comparatively short time ago, reactions from gold and sodium thiosulphate were not feared, yet today we always have some apprehension when treating a case of lupus erythematosus with gold compounds. I do not be'ieve that the amount of the dose has anything to do with the reaction. One patient, following three weekly injections of 25 mg. doses, developed a generalized dermatitis, which went the regular course. The symptoms were almost identical with an arsenical dermatitis. There was a weepy stage, exfoliation and loss of hair and nails, and recovery in about three months.

The fatal case which Dr. Hamilton reported was seen by me before her visit to him. This patient had a very typical type of lupus erythematosus, with the characteristic bat wing distribution on the cheeks and bridge of the nose, with open follicles and some atrophy. The patient was an arthritic, had had an elevation of temperature at intervals for several months, and also had a characteristic phenolphthalein eruption, which disappeared immediately on withdrawal of pheno'phthalein.

Her physician was advised to begin with 25 mg. of gold sodium thiosulphate. Only two were given. I believe, from Dr. Hamilton's paper, that it was debatable whether the temperature was due to the arthritis or to a tuberculous process.

Dr. Hamilton (closing).—The use of ethyl chloride spray as a synergistic agent is worthy of consideration. This may explain the reason for the rapid recovery in patients who develop a dermatitis. It is possible that any focal reaction will act as a synergistic agent.

CONCENTRATED FEEDINGS IN THE NUTRITION OF PREMATURE INFANTS*

By C. H. WEBB, M.D.,
Shreveport, Louisiana

Adequate nutrition of the premature or immature infant presents special problems, related not only to the imperfect physical development of these infants, but also to the relative disproportion between the nutritional requirements and the digestive capabilities.

It is generally agreed that breast milk is the most nearly perfect food for the human infant. Von Reuss,[1] in a recent article, stated that premature infants should be fed only breast milk. Even with this, several problems are encountered. Besides the question of availability, breast milk is a comparatively dilute food, which renders it difficult to meet the caloric requirements of the premature infant with his limited gastric capacity. Hess and Chamberlain[2] found these requirements to be 100 to 150 calories per kilogram regularly and sometimes as high as 200 calories per kilogram. This might necessitate as much as 300 c. c. (10 ounces) of unchanged breast milk per kilogram of body weight daily.

According to Birk,[3] the six months fetus contains 25 grams of ash, while the infant at term contains 100 grams, showing a tremendous storing of minerals during the last three months and indicating a mineral deficiency in the premature infant. Hamilton[4] found that the calcium retention of premature infants might be very small during the first two to four months of life and was of normal magnitude only in those cases where the intake exceeded 0.2 grams of calcium oxide daily. This would necessitate an intake of over 400 c. c. (13 1/3 ounces) of breast milk per day.

Various formulas and modifications of breast milk have been suggested to overcome these deficiencies, including Gerstenberger's[5] S.M.A. protein milk, evaporated human milk, dried human milk as advocated by Emerson and Smith[6] and additions to breast milk of calcium caseinate (Poole and Cooley[7]) and various carbohydrates.

The infants in the present series, unless able to nurse at the breast, were given one of two simplified formulas designed to meet the above requirements. When breast milk was available, *Formula 1* consisted of breast milk two parts, evaporated cow's milk one part. This formula combines the assimilability of breast milk with the higher caloric value and larger content of minerals and proteins of the evaporated milk. The composition is fat 5.29 per cent, carbohydrate 7.97 per cent, protein 3.2 per cent, minerals 0.63 per cent, and water 82.91 per cent, affording 92 calories per 100 c. c., or 27 calories per ounce. The calcium content is 0.1305 grams per 100 c. c., whereby Hamilton's[4] minimum of 0.2 grams would be furnished by 155 c. c., or less than 6 ounces per day, an amount exceeded by all of our infants.

CONCENTRATED FORMULAS USED IN THE FEEDING OF THE PREMATURE INFANTS IN THIS SERIES

Formula 1

Breast Milk	2 parts	Percentage Composition	
Evaporated milk	1 part	Fat	5.29
		Carbohydrate	7.97
Caloric value		Protein	3.20
92 calories per 100 c. c.		Minerals	0.63
27.6 calories per ounce		Water	82.91

Formula 2

Evaporated milk	1 ounce	Percentage Composition	
Karo or cane sugar	1 dram	Fat	3.93
Water to total	2 ounces	Carbohydrate	11.62
		Protein	3.40
Caloric value		Minerals	0.75
95 calories per 100 c. c.		Water	80.30
28.5 calories per ounce			

When breast milk was not available *Formula 2* was evaporated milk one ounce, Karo syrup or cane sugar one dram and water to make two ounces, affording 95 calories per 100 c. c., or 28.5 calories per ounce, and having an even higher mineral content than the first formula. Marriott,[8] Brennemann[9] and others have demonstrated that evaporated milk, due to its altered physiocochemical properties, is readily digestible and produces rapid growth in infants. Recently, Jeans and Stearns[10] found that infants fed with evaporated milk had high retentions of nitrogen, calcium and phosphorus, together with rapid growth in body length and good muscular development. Swanson[11] likewise reported that mineral retention per unit of growth was higher with cow's milk (powdered) than with breast milk.

The present discussion is based on the observation and care of 83 premature or immature infants during the past two years, 10 seen in private practice, 73 on the new born service of

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the Shreveport Charity Hospital. While some lack of agreement exists as to the criteria by which one may judge of maturity, for the purposes of this study the usual limit of 5½ pounds or 2,500 grams, was adopted. Of the 83 infants, 26 were white, 57 were colored. Although no attempt was made to establish the etiology in every case, it was observed that 14 of these infants resulted from multiple births, 10 had luetic mothers and 6 were born of mothers with eclampsia or pre-eclamptic toxemia. The last two groups are important in that syphilis and toxemia increase the infant mortality, as well as interfering with the nutrition.

Of these 83 infants, 23 (27.7 per cent) died within forty-eight hours after birth. Deaths within this period of time may be attributed to innate lack of viability or to birth trauma, and are not related to the nutrition. For this reason these cases are eliminated from the following discussion, leaving 60 infants which survived this 48-hour period.

A brief discussion of the general care and feeding methods used may be pertinent. Maintenance of satisfactory temperature was secured for the larger infants by the use of hot water bottles. The smaller infants (under 4 to 4½ pounds) were kept in incubators. Hess incubators were used for a few, but for the majority an adaptation of the simple Nobel box (*Figure 1*), as described by Parmelee[12] was used. Handling was reduced to a minimum, with all care of the babies effected without removing them from the incubators, except for weighing every other day.

Water or 5 per cent glucose solution was started at four hours after birth and feedings at eight to twelve hours, continuing at three-hour intervals. Those infants which exceeded 4 pounds in weight and were in good condition were put to the breast, then offered complemental feedings of *Formulas 1* or *2* until the supply of breast milk was adequate. All of the babies over 5 pounds in weight were successful in breast feeding and most of those in the group from 4 to 5 pounds.

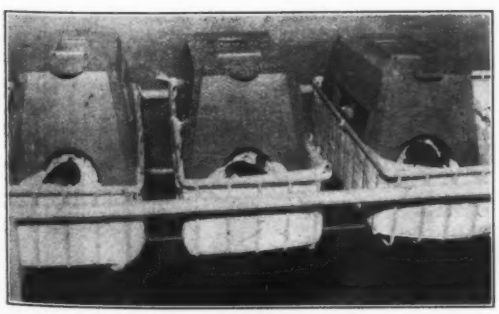

Figure 1

Premature infants in Nobel boxes, Shreveport Charity Hospital new born nursery. Note how the boxes fit in the ordinary infant crib. Note also the ventilators and the observation windows in the tops.

For the infants under 4 pounds, breast feeding was not attempted, it being deemed advisable to keep them in the incubators. Various methods of feeding were tried, including the regular bottle, the Breck feeder, the medicine dropper without and with Sauer's[13] modification, but all of these proved less satisfactory than gavage, which insures adequate intake without exhaustion, and is now used routinely for these smaller infants. Our custom is to start with 8 to 15 c. c. of formula every three hours, increasing as rapidly as tolerated until the caloric requirements are reached and the baby is gaining weight. Catheter feedings are continued until the baby is strong enough to take the bottle successfully.

Two special procedures are considered worthy of discussion. In an effort to reduce the hemorrhagic manifestations to which premature infants are particularly susceptible, we have adopted prophylactic injections of whole blood intramuscularly in 15 to 30 c. c. amounts, preferably on the first or second day. From one to three injections were given to 39 of the 60 infants studied, including all under 4 pounds in weight. Hemorrhagic manifestations were observed in only 3 of the 39, in whom autopsy demonstrated cerebral hemorrhage as the cause of death. In a recent report, Heffernan[14] stated that routine prophylactic injections of whole blood markedly reduced the instance of hemorrhagic accidents in his new born cases. It is my opinion that this measure has additional value for the premature in furnishing antibodies, in affording readily assimilable proteins, and in helping to prevent anemia.

A second measure which has proven valuable is the subcutaneous injection of saline solution. Because of the limited stomach capacity, I prefer to reserve the gastro-intestinal system for the concentrated feedings, giving extra fluids during the early days of life by hypodermoclysis. From one to eighteen injections each were given to 44 of the 60 infants, injecting 40 to 50 c. c. of sterile physiologic solution of sodium chloride into the loose tissue of the axillae. It is not necessary to remove the infant from the incubator and if the syringe method with

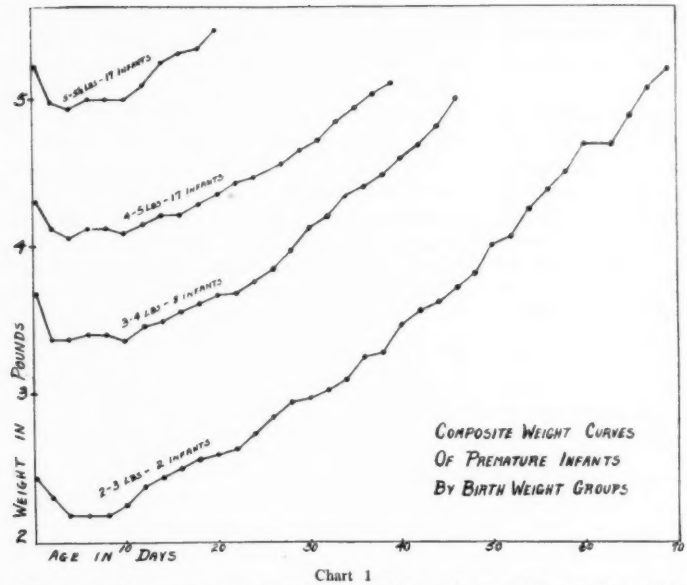

Chart 1

Composite weight curves of 44 premature infants during their hospital stay, by weight groups. Note that the rate of gain is slightly greater in the lower weight groups than in the higher groups.

massage is used only eight to ten minutes are required for the injection. In all cases the fluid was well absorbed and no untoward effects ensued.

Of the 60 infants which survived the first forty-eight hours, 14 died while in the institutions, a mortality of 23 per cent for this group, and a total mortality of 44.5 per cent. Hess and Chamberlain[2] had a total mortality of 48 per cent of 266 premature infants, with a drop to 35 per cent mortality exclusive of the first 24 hours. Bridges[15] reported a total mortality of 75 per cent, Gries[16] in Germany of 55 per cent, Crawford[17] at Philadelphia Lying-In of 35.5 per cent.

In our series the 46 infants which lived averaged 4 pounds 9 ounces (2069 grams) weight at birth and showed an initial weight loss averaging 6¾ ounces (189 grams). This loss occurred at an average of 5½ days and the average birth weight was regained by 14 days. Cook[18] reported an average weight loss of 7¾ ounces (220 grams) with the birth weight regained by the nineteenth day. Grulee[19] considered this a fair average. For our 46 cases, the rate of gain in weight, after the initial loss, averaged 20.6 grams, or ¾ ounce per day. It was noted (*Chart 1*) that the rate of gain was more rapid in the lower weight groups.

Eighteen of these infants received one or both of our concentrated formulas exclusively and all of the others took them for various periods of time as complemental or supplemental feedings, or until they were strong enough to take the breast. Fourteen of the smaller infants received these formulas in measured amounts for periods varying from 7 to 25 weeks (*Chart 2*)

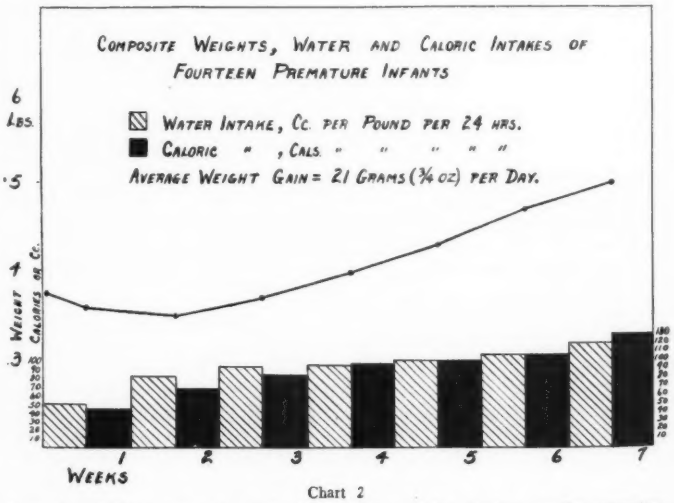

Chart 2

Composite weight curve, water and caloric intakes of the fourteen smaller premature infants which were fed exclusively with the concentrated formulas for seven or more weeks. Note that after the fifth week the caloric intake of these infants equalled or exceeded 100 calories per pound daily.

Table 1

AVERAGE DAILY VOLUME AND CALORIC INTAKE OF FOURTEEN PREMATURE INFANTS FED EXCLUSIVELY WITH CONCENTRATED FORMULAS

Name	Birth Wt. Lb. Oz.	First Week		Second Week		Third Week		Fourth Week		Fifth Week	
		Vol. in c. c. per day	Cal. per lb. per day	Vol. in c. c. per day	Cal. per lb. per day	Vol. in c. c. per day	Cal. per lb. per day	Vol. in c. c. per day	Cal. per lb. per day	Vol. in c. c. per day	Cal. per lb. per day
B. R.*	2-6	107	44	192	80	227	85	256	92	260	80
B. A.	2-9	122	44	178	68	248	88	288	91	320	95
B. D.	3-1	175	53	156	47	240	77	279	89	317	90
B. H.*	3-11	122	31	315	81	319	82	316	69	320	85
B. S.	3-12	178	49	292	84	381	99	396	93	400	80
B. M.*	3-13	124	29	185	45	276	65	324	74	315	66
B. K.	3-13	172	33	424	49	551	94	574	144	634	147
B. M.	3-15	296	75	353	96	367	96	454	126	583	143
B. K.	4-0	137	33	271	69	371	90	400	89	451	90
B. H.	4-1	190	46	330	80	471	114	390	92	454	100
B. G.	4-3	176	74	426	107	416	106	515	123	591	137
B. P.	4-4	137	33	218	48	281	61	573	126	663	135
B. K.*	4-7	169	32	257	51	280	54	286	53	320	63
B. R.	4-14	228	44	313	55	337	62	463	88	489	93
Averages		167	44	280	68	340	84	394	96	437	100

*Private patients.

and furnished the material for our observations on caloric intake. These infants averaged 3 pounds 12½ ounces (1715 grams) weight at birth, and with one exception were given incubator care and gavage feedings. Their average daily intake (*Chart 2* and *Table 1*) increased from 167 c. c. (5½ ounces), furnishing 44 calories per pound during the first week, to 437 c. c. (14½ ounces), furnishing 100 calories per pound during the fifth week. They exhibited an average gain of 21 grams per day, slightly better than the entire group containing the larger breast-fed infants. A considerable variation in the amounts taken was noted (*Table 1*) and five of these infants required as much as 140 calories per pound (308 calories per kilogram) per day for one or more weeks before showing satisfactory gains.

The four private patients in this group (*Table 1*), who received more careful attention, showed especially good response to the high caloric regime. They had an average weight loss of 5½ ounces (154 grams), which was regained on the thirteenth day, and gained at the average rate of 26 grams per day. Three of these infants received *Formula 2* exclusively after the second week.

None of the ill effects usually attributed to overfeeding was observed. With the exception of one case of pylorospasm, controlled by atropine, vomiting seldom occurred after the first week. The stools averaged four to six daily, were yellow in color, and soft. Diarrhea of moderate severity occurred in three of the infants. It apparently was associated with respiratory infections and responded well to breast milk-calcium caseinate feedings. The other infants were in excellent condition and whenever possible were kept in the hospital until they had attained a weight of at least five pounds. The private cases were transferred to incubators at home and followed there.

Antirachitic agents were given early, starting with 10 drops of viosterol daily in the second week, increasing by the third week to 20 drops. At four to six weeks, cod liver oil was added and sun baths were advocated as soon as possible. These measures seemed adequate to prevent active rickets in the patients followed through longer periods of time.

To prevent or alleviate secondary anemia, iron and ammonium citrate in the dosage of one grain per pound body weight daily was given after the second to third week. Nine of eleven infants tested at one to six months after birth had hemoglobin contents varying from 70 to 90 per cent. Two of the Charity Hospital series had 60 per cent hemoglobin at eight weeks of

age, with some improvement on increasing the dosage of iron. Abt and Nagel[20] reported better results in preventing anemia in premature infants from iron combined with liver extract than from either alone, and advocated starting these within two weeks after birth.

SUMMARY

Concentrated, high caloric feedings were apparently well tolerated by premature infants. Two simplified, easily available formulas, utilizing breast milk whenever possible, are suggested. Eighteen premature or immature infants, fed these formulas exclusively, and twenty-eight infants fed them in addition to breast feedings, showed weight gains above the usual for such infants.

Intramuscular injections of whole blood and subcutaneous injections of saline solutions are offered as means of combating hemorrhagic manifestations and excessive weight loss in the premature infant during the first days after birth.

The early administration of antirachitic agents and iron in adequate amount is stressed.

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DISCUSSION (*Abstract*)

Dr. J. B. Stone, Richmond, Va.—In the feeding of premature infants two primary factors are to be considered: first, the theoretical optimum food requirements; and second, the individual infant's digestive capacity.

(1) We know that the premature is born with a deficiency of certain mineral salts, especially iron and calcium. Also it has a low serum protein concentration, suggesting protein starvation and the need for a high protein diet. By the end of six to eight weeks there is a marked drop in red blood cells and hemoglobin, and besides this tendency to become anemic, it is especially prone to develop rickets. Therefore, a food of high caloric value, and one rich in protein, minerals and vitamins seems especially indicated.

(2) In providing a food of the above character it is necessary to recognize the premature's inadequate physical development and therefore the impaired function of his organs of digestion and assimilation. In estimating the functional capacity of the premature's digestive tract the stage of development is more important than absolute age and weight.

Consequently, prenatal developmental retardation must be considered and the food modified in the light of both theoretical requirements and individual capacity for food as determined by rational trial.

Basal metabolism is low and food requirements are small during the first week or ten days, but subsequently, on account of greater need for growth, the food requirements are relatively greater than in the case of the full term infant. In the endeavor to meet the theoretical requirements care is needed lest the capacity for food be exceeded. Overfeeding may result in too frequent stools, vomiting, gastric distention with pressure on the diaphragm and embarrassed respiration, and may sometimes lead to a fatal outcome.

The problem is to give as much food as the infant can tolerate without causing a gastro intestinal disturbance.

A good quality breast milk is always to be preferred, and even on this better gains can be obtained after four to six weeks by the addition of 2 per cent casein in the form of calcium caseinate or of extra protein from some other source. In the absence of breast milk, I have obtained best results with an acidified evaporated milk, Karo, and water mixture, or with one of the powdered lactic acid milks. From the work that we have just heard reported, it would seem that the addition of the lactic acid is not an important matter.

Considering the infant's need and digestive capacity, I believe it best during the first few days to give small amounts of a dilute food mixture and then increase its strength and quantity as rapidly as can be tolerated, up to the point that will cause a steady gain.

The importance of fluids has been stressed and cannot be over-emphasized. The maintenance of a rather high atmospheric humidity is also extremely important in maintaining the premature's body fluids in the presence of the external heat needed to keep up his body temperature.

Undue handling is to be scrupulously avoided, and best results can be obtained if the infant is entrusted to the care of one competent nurse.

For the successful rearing of the premature I consider expert nursing care to be as important as the scientific prescribing of the formula. Frequent change in the nursing staff often means disaster for the premature.

Summarizing this discussion: (1) it is necessary to recognize the premature infant's nutritional needs and to adapt the food to meet these optimum needs, with due consideration of the individual infant's capacity for food. (2) Environmental conditions should be carefully regulated as to temperature and humidity. (3) Careful nursing without frequent change of the

nursing personnel is extremely important if the best results are to be obtained.

Dr. Webb (closing).—I first had the opportunity of observing the effects of concentrated feedings several years ago at the University of Minnesota Hospital, where lactic acid milk with added carbohydrate was used. Later it was my privilege to work with Prof. Swanson, of the University of Chicago, at Chicago Lying-In Hospital. Breast milk or evaporated milk formula, concentrated by the addition of carbohydrates, was used. The results were so good that I have adopted this type of feeding routinely for premature infants. The breast milk-evaporated milk combination was used chiefly because of its economy and ease of preparation.

MANAGEMENT OF INTRACRANIAL BIRTH INJURIES*

By WILLIAM O. OTT, M.D.,
Fort Worth, Texas

Intracranial hemorrhage as a result of injury at birth is not an uncommon occurrence. The frequency is universally acknowledged to be increased by prematurity, operative interference and difficult labors; but it may occur in perfectly normal labors. Roberts[1] reported four hundred twenty-three spinal punctures on new born infants in which sixty showed a bloody cerebrospinal fluid; two of these had hemorrhagic disease, leaving fifty-eight resulting from trauma. There can be no question of the comparative frequency of this condition.

Chase[2] found the intracranial hemorrhage in thirty-two fatal cases confined almost exclusively to the subdural spaces with tentorial tears in many. In fifty-six fatal cases Munro[3] found meningeal and intracortical hemorrhage with cerebral congestion and edema to be the next most common findings. In the living there is an extreme hyperemia of the cortex. The amount of subarachnoid fluid is increased and it is bloody or blood-tinged when the injury is recent, xanthochromic later. I have seen no other cerebral condition which gives rise to such a red hyperemic brain as these cases of birth injuries during the first week of life.

The question naturally arises as to the proper treatment, if any, in these injured babies. Repeated spinal drainage has been almost universally recommended as the method of choice, combined with some method to increase the coagulability of the blood. It has seemed to me that spinal drainage alone in all cases, irrespective of the nature and site of injury, is not adequate. In many of the cases the patient does not improve with spinal drainage and in others the amount of fluid that can be obtained is not sufficient to be of value. This is especially true when the location of the injury is mainly supratentorial. I have tried to determine clinically the type of injury, although I must admit that one cannot always be sure of the exact location of the lesion. When the injury or hemorrhage is mainly in the region of the medulla, cervical cord or brain stem, as often occurs from tentorial tears, I think these cases can be recognized clinically.

The symptoms of intracranial hemorrhage are respiratory disturbances and cyanosis, restlessness with a peculiar cry, difficulty in nursing, and in not a few, twitching about the eyes and face with convulsions. The convulsions are often more marked on one side. In the babies with marked cyanosis and marked respiratory disturbances with a tendency to opisthotonos, usually the main site of hemorrhage is around the brain stem, especially about the tentorium, often with injury to the medulla. These children will often have a rather large amount of blood in the cerebrospinal fluid. Those in which the predominating symptoms are twitching, restlessness, crying out, convulsions and transient blue spells are more apt to have a cortical irritation. It is in these cases that I have felt that spinal drainage is less likely to be adequate. Should the symptoms persist after repeated drainage, or if free drainage is difficult, I feel that operative procedures are justifiable.

The cases operated upon, on which this paper is based, were selected from a fairly large number of injured babies seen in consultation. Many of these children recovered after repeated spinal drainage; others with more severe injuries have either died or have turned out to be invalids. I am not in possession of sufficiently complete records of non-operated cases to give the mortality and the percentage having a residue from the injury in this group. Of nine cases operated upon, two died within twenty-four hours following the operation. One of these was operated upon three months after birth and there was already very marked porencephaly and brain atrophy. The other was a patient in which no fluid was obtained on spinal puncture, but after death almost pure blood was aspirated from the spinal canal. This baby had remained cyanotic with many respiratory symptoms from birth and there was apparently a hemorrhage about the tento-

*Read in Section on Neurology and Psychiatry, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

rium and in the posterior fossa. A subtemporal decompression was done, which in retrospect was a mistake. One child had a large hemorrhage about the tentorium and into the posterior fossa. An obstructive hydrocephalus developed from the exudate. This child was operated upon six weeks after birth, at which time a suboccipital exploration was done and the exudate removed. It progressed nicely for several weeks and seemed normal. The obstruction formed again and a second operation was done, which was followed by another period of relief. Death occurred at the age of eleven weeks from obstructive hydrocephalus. Autopsy revealed a large organized hemorrhage about the tentorium with a lemon yellow exudate sealing the occipital lobes above and the cerebellar lobes below to the tentorium. The aqueduct was open and the fourth ventricle was dilated. There were no signs of hemorrhage into the ventricles and hydrocephalus was produced entirely by the exudate formed about the posterior foramina. The remaining six cases, in which a subtemporal decompression was done, had marked irritative cerebral symptoms with convulsions, twitching, transient spells of cyanosis and restlessness. The symptoms subsided in these cases within twenty-four hours after the operation and convalescence was uneventful. Almost the entire squamous portion of the temporal bone was removed in each case and the dura left open. The decompression area bulged from six to eight weeks and then subsided. All except one of these children are over two years of age and they have remained perfectly well without convulsions or mental defect. One is nine months of age and is apparently normal.

The cases operated upon, which are those reported above, are the ones in which spinal drainage did not seem to be accomplishing results or in which it was felt that the trouble was primarily cortical and operative procedures were indicated. As previously mentioned, the finding of increased accumulation of the subarachnoid fluid, along with blood-tinged or bloody fluid with an increased intracranial pressure, was uniformly present in these cases. The question of the manner in which such a procedure would be beneficial presents itself. There are two beneficial effects. One is the decompression to the congested and hyperemic brain; the other is the mechanical removal of the bloody subarachnoid fluid, together with seepage of this fluid under the scalp, which continues for a week or ten days following the decompression. In cranial surgery for tumors, it is my personal observation that when there is a seepage of subarachnoid fluid under the scalp the patient will make a smooth postoperative convalescence. This observation also applies to these babies and if there is a boggy edematous scalp, the postoperative course is smooth and the symptoms quickly subside. I feel that this constant seepage of cerebrospinal fluid under the scalp is more efficacious than repeated spinal drainage. The case operated upon three months after birth illustrates the presence of subarachnoid bleeding untreated. The brain did not occupy more than three-fourths of the calvarium, there being a porencephaly with areas of jelly-like exudate over the entire cortex. I have seen the beginning of this condition in a baby three months of age following a fracture of the skull with a subarachnoid hemorrhage.

This brings up the subject of the production of cerebral atrophy and sclerosis with associated mental and motor deficiency. There can be no question of the causal relation of birth injury to many of these cases. The cause of these changes in the brain is as yet controversial, but whether one accepts the theory of interference with spinal fluid absorption by the arachnoid villi resulting from injury or disease, and a consequent chronic increase of pressure giving rise to cortical atrophy; or as the result of multiple petechial hemorrhages throughout the cortex with subsequent degenerative changes; or lastly as the result of defective myelinization brought about by trauma or otherwise and affecting the normal development of the spongioblastic elements, the fact remains that a considerable number of these babies develops motor difficulty with mental deficiency. The pathological changes consist essentially of cortical atrophy, sclerosis with porencephaly and a marked defective myelinization. The exact manner in which these injuries result in a defective development of projection and association fibers is yet to be clarified.

In the management of cerebral birth injuries, an attempt should be made to determine the location and extent of the injury. In the cases with major involvement of medulla, cervical cord, or mid-brain, repeated spinal drainage is probably the best procedure. Should signs of obstructive hydrocephalus develop, suboccipital exploration may be advisable. In those cases in which the symptoms point to cortical involvement, repeated drainage should be tried. If the symptoms do not subside or if drainage is not adequate, a subtemporal decompression may be advisable. This can be done with little danger

and in the cases in which I have used this method the subsidence of the symptoms has been almost immediate. The edema and cerebral congestion persist for six to eight weeks after birth, and I feel that it is important to relieve this condition during the first week or two of life. The prolonged cerebral edema and congestion with increased intracranial pressure may be an important factor in the causation of mental deficiencies, epilepsies, and so on, that follow birth injuries. The fact that the cases herein reported were all severe injuries with serious clinical symptoms, and none has developed signs of motor difficulties, mental defects or convulsions, encourages me to feel that the results are better than would have been obtained by repeated spinal drainages alone.

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THE MANAGEMENT OF OCCIPITOPOSTERIOR POSITIONS WITH SPECIAL REFERENCE TO THE SCANZONI MANEUVER*

By JOSEPH WILLIAM REDDOCH, B.S., M.D.,
New Orleans, Louisiana

Persistent occiput posterior positions, because of their relative frequency, possibly cause obstetricians more anxiety than any other condition encountered in vaginal deliveries. The first recorded attempt at instrumental rotation was that of William Smellie,[1] who in 1745 performed a successful forceps rotation of the occiput. In his case, an effort at manual rotation had failed, but spurred by a desire to improve on the mutilating operations in practice at that time, he rotated the head with forceps, overcorrecting as we now do, and delivered a normal living child. His procedure did not become generally known or practiced and consequently fell into temporary oblivion. In 1830 Scanzoni revived and improved Smellie's operation and created the maneuver which we now know by his name.

Etiology.—The cause of persistent posterior positions is rather obscure. Such conditions as parity, pendulous abdomen, deflexion of the head, contracted pelvis, brachycephaly, dry labor, and rigid cervix have been considered responsible either singularly or in combination. Hanson[2] has recently made studies on the bispinous diameter at the outlet. In 620 cases, the average measurement was 10.5 cm.; 107 had a diameter of 9.5 cm. or less. In this latter group, there were 10 persistent posteriors. From his observation it seems possible that a contracted bispinous may retard or prevent rotation in the lower pelvis. Thoms[3] has studied the relationship of the transverse diameter at the inlet to the true conjugate, and infers from a small series of cases that a distorted ratio between these diameters, with or without actual shortening of the transverse at the inlet, may have some bearing on this condition.

FREQUENCY.—The frequency of occiput posteriors has been variously placed from 14.4 per cent to 29.8 per cent. From the Hutchinson Memorial Clinic out-service there were 49 in 150 vertex cases, or 32.67 per cent. In those from the combined services at the Charity Hospital included in this paper there were 136 in 798 vertex cases from January 1 to May 1, 1932, or 17.04 per cent. *Table 1* shows the frequency from other clinics as compared wth this series:

Table 1

FREQUENCY OF OCCIPUT POSTERIOR POSITIONS

	Vertex	Occ. Post.	Per Cent
Hutchinson	150	49	32.67
Charity	798	136	17.04
Dodek[4]	1785	514	29.9
Danforth[5]	1137	285	25.1
Lull[6]	927	204	22.1
Scott[7]	1000	144	14.4

Obviously, some were not recognized before the head had rotated and what had originally been a posterior position was diagnosed as anterior. It appears, therefore, that cases in which rotation takes place with little or no difficulty are likely to be overlooked by the more casual observer, the persistent cases only being recognized.

Diagnosis.—The diagnosis of an occiput posterior position is of prime importance if the case is to be handled properly. Prenatal care should include the pre-labor position, this to be checked again at the onset of labor and confirmed later by the location of the fontanels and sutures.

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†From the Department of Obstetrics, School of Medicine, The Tulane University of Louisiana and the State Charity Hospital at New Orleans.

The four maneuvers (*Fig. 1*) are useful here.[8] With this procedure, we find the back toward one flank, the soft parts directed anterolaterally toward the opposite side, and the head down with the cephalic prominence near one of the iliopectineal eminences. The plane of the fetal triangle which is formed by the back, arms, and thighs gives further index as to the degree of rotation.[9] Anteriorly, there is a prominence toward one of the iliopectineal eminences (forehead) and a depression opposite the other.[4] Vaginal examination (*Fig. 2-a*) after the cervix

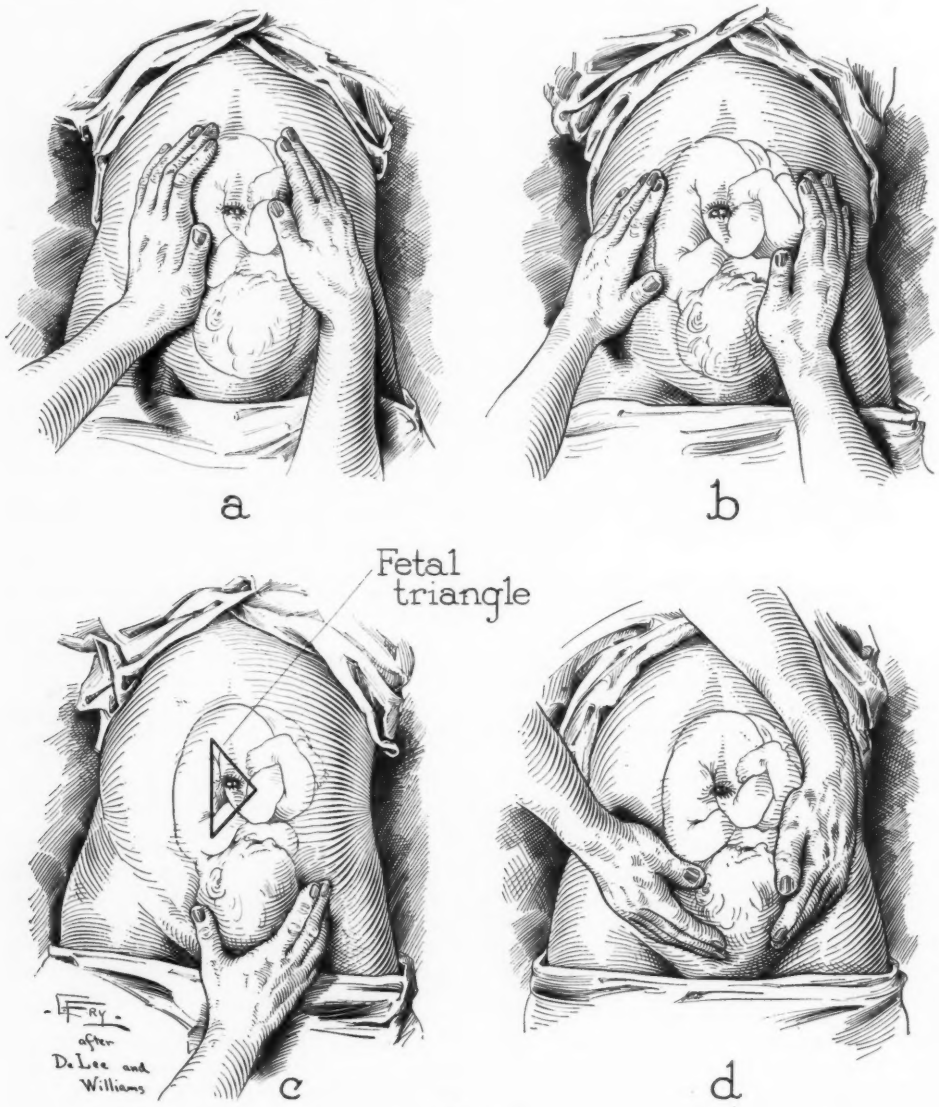

Fig. 1

Diagnosis of occiput posterior (right). Abdominal palpation, four maneuvers—(a) first: palpating fundus for contents; (b) second: palpating sides for back and small parts; (c) third: palpating lower uterus for head and cephalic prominence; and (d) fourth: locating head after engagement.

has sufficient dilatation, with the head well flexed, reveals the saggital suture in one of the oblique diameters with the Y-shaped lambdoidal sutures converging into the small fontanel which is near the center of the dilating os. The diverging, more peripheral ends enclose the occipital bone which is directed toward one of the sacro-iliac synchondroses; the anterior fontanel can be felt with difficulty behind one of the iliopectineal eminences. When the head is partially extended (*Fig. 2-b*) the same picture is found except that the anterior (large) fontanel is felt more easily and the small one less prominently posterior. In either, later in labor, the direction of the pinna of the ear confirms the other findings. The heart sounds are usually heard better in the flank, a little more posterior in the left positions than in the right. As rotation takes place, the heart tones become more anterior.

The course of labor is rather characteristic in the persistent positions. The pains may be nagging, and the membranes may rupture at or before the onset of labor, resulting in slow dilatation of the cervix. The presenting part is likely to be directed toward the posterior extremity of one of the obliques, and in this region there is a fullness. In the cases in which there is much deflexion of the head, engagement may fail to take place even after hard pains. In any vertex case in which the back is on the right side, an occiput posterior should be suspected and treated as such until proved otherwise.

Management.—Authorities differ as to the number of cases that will deliver without interference. Of the Hutchinson Memorial Clinic cases, 42 out of 49 rotated spontaneously, or 85.7 per cent, with 36 spontaneous deliveries. In the Charity Hospital group there were 207 spontaneous rotations out of 265 cases, or 78 per cent; of this number 154 delivered spontaneously and the remainder had forceps after rota-

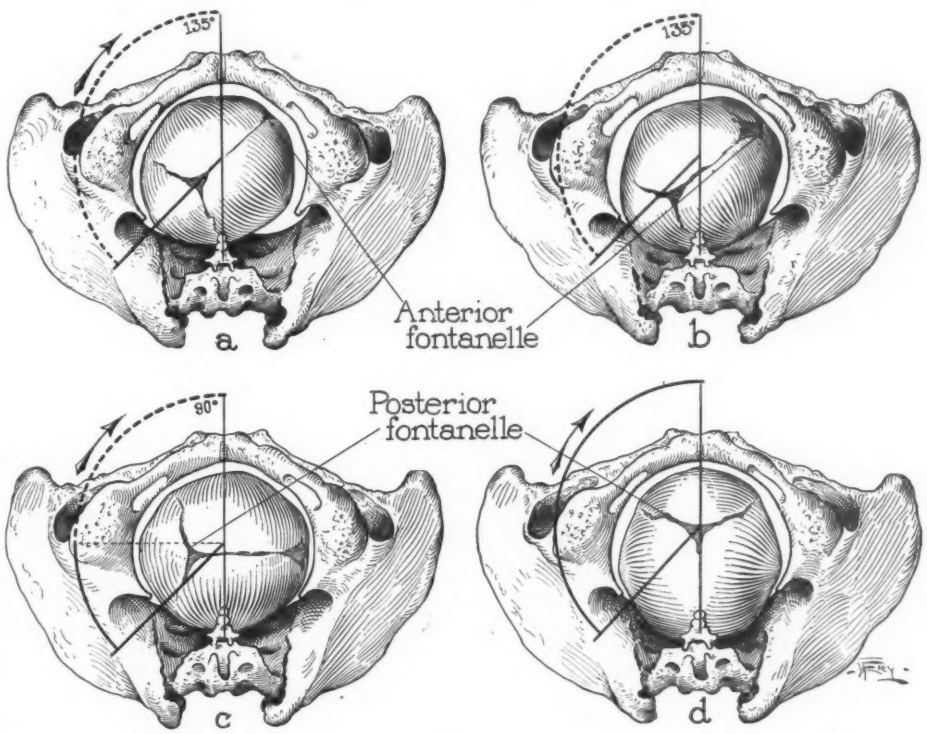

Fig. 2

Diagnosis of occiput posterior (right). Vaginal findings at various degrees of rotation—(a) head engaged, flexed; saggital suture in right oblique; small fontanel posterior; no rotation. (b) Same as (a), except head partially extended, anterior fontanel easily palpable. (c) Head in transverse diameter, rotation 45 from (a). (d) Rotation complete, head low.

tion. Greenhill, in a personal communication, stated that it was expected at the Chicago Lying-In that 9 out of 10 would rotate spontaneously. In Bill's[10] hands the percentage is much lower, there being only 148 out of 514 cases, or 28.8 per cent, with one spontaneous delivery. One might be inclined to feel, therefore, that spontaneous rotation depends upon the length of time the patient is allowed to go unassisted in the second stage. It is the opinion of E. L. King, the guiding factor at Tulane, that one and a half to two hours of hard pains without progress, after the os is dilated, are sufficient unless the maternal or fetal condition warrants earlier interference.

First Stage.—The management of the first stage is important, for if it is properly handled the patient's energy is conserved and she is thereby better able to go through the second stage unaided. The cervix is usually slow in its dilatation and obliteration, especially if the bag of waters has ruptured early. The pains are inadequate, the patient restless and uncooperative. Morphine given in ¼ grain doses, not sooner than three or four hours before the expected delivery, but before exhaustion takes place, is of value in helping the parturient to obtain rest. The cervix after such a period of relaxation is softened and often completely dilated or dilatation is effected after two or three additional hours of labor. Sometimes it is advisable to use iso-amylethyl barbituric acid (amytal) or scopolamine to reinforce the action of the morphine. Should dilatation fail after a reasonable length of time or the pains cease, a bag is invaluable in obtaining it.

Second Stage.—After two hours of hard second-stage pains with little or no progress, nothing is to be gained by waiting and it is possible that interference cannot be delayed with safety this long. If the mother's blood pressure rises, or the pulse increases to 100, or any other acute concomitant pathologic condition occurs, interference may be indicated. On the part of the fetus, irregular heart between pains, slowing heart to 100 per minute or increasing to 160 per minute, meconium in the amniotic fluid(?), prolapsed cord or premature separation of the placenta in the second stage would be indications for an earlier intervention. Of course, the latter conditions may occur in the first stage, in which event some other procedure must be followed, either manual dilatation, Duhrssen's incisions or cesarean section.

It has been our experience that relatively few cases will fail to engage and require version. Manual rotation suffices for a large percentage of those needing interference after the head is in the pelvis. Should this fail, of course, it is necessary to employ some other procedure. For years, we have preferred the Scanzoni maneuver, modified somewhat from the original, for those requiring instrumental rotation. Perhaps a translation of the original Scanzoni technic will be of interest.

"The head stands with the forehead turned toward the front and left, so that the saggital suture passes in the right oblique diameter; the left blade is applied in front of the left sacro-iliac synchondrosis, the right behind the right obturator foramen: with this the transverse diameter of the forceps is placed in the left oblique diameter of the pelvis, their concave edges and tips are turned to the anterior circumference of the left lateral hemisphere of the pelvis, and so also with the forehead. An eighth of a circle is now described with the instrument, directed from left to right, whereby the right blade comes to rest under the symphysis, and the left in the hollow of the sacrum; and in this way, the head is rotated, the earlier standing forehead is moved to the middle of the left lateral wall of the pelvis, and the saggital suture is placed parallel with the transverse diameter of the pelvis.

"Now both blades of the forceps are removed, and again applied, so that the left blade comes to lie behind the left obturator foramen, the right in front of the right sacro iliac ligament, whereupon by the next rotation the occiput is brought completely under the pubic arch."[11]

Table 2 shows the methods employed last year in the management of occiput posteriors occurring in the Hutchinson Memorial Clinic outservice and in those from the State Charity Hospital included in this series.

Table 2

METHODS USED IN OCCIPUT POSTERIORS AT HUTCHINSON CLINIC AND CHARITY HOSPITAL

	H. M. C.	Charity
Spon. rot. and del.	36	154
Spon. rot. with low forceps	6	34
Spon. rot. with mid forceps	0	7
Scanzoni	1	22
Kielland	1	7
Manual rotation	4	5
Del. occ. post.		
Spontaneous 1	 11	
Low forceps 0	 5	
Mid forceps 0	 3	
Total	1	19
Version	0	13
Cesarean	0	2
Tarnier	0	2
Total cases	49	265

One Scanzoni attempted, not in the list above, was unsuccessful and another procedure was substituted. Three of the versions were demonstration cases.

In the Hutchinson Memorial group of cases there were no fetal deaths. All these cases were delivered in the home and all had the constant attention of a senior medical student, the staff men being called at the beginning of the second stage. Those requiring operative delivery were handled by the staff men. The Charity Hospital group represents cases many of which were admitted after previous instrumentation and were obstetrical emergencies. In all of these cases there were thirteen fetal casualties divided among the various procedures as follows:

Table 3

ANALYSIS OF 13 FETAL DEATHS

	Cases	Per Cent
Hutchinson	0	0
Charity		
Spon. rot. and del.	2	1.3
Spon. rot.-low forceps	1	2.9
Spon. rot.-mid forceps	1	14.0
Scanzoni	2	9.0
Del. post.-low forceps	3	60.0
Del. post. spon.	1	9.0
Versions	2	6.0
Tarnier	1	50.0
Total in Charity group	13	4.9

Table 4 gives an analysis of the possible causes of the fetal deaths.

Table 4

POSSIBLE CAUSES—FETAL DEATHS IN CHARITY SERIES

	Number
(1) Intracranial hemorrhage 1 Scanzoni, 1 Tarnier, 1 transverse arrest, and 1 spon. occ. post. del.	4
(2) Pre-eclampsia Mid forceps after spontaneous rotation	1
(3) Nephritis Spontaneous rotation and delivery	1
(4) Antenatal trauma Del. occ. post., low forceps, macerated fetus	1
(5) Premature separation of placenta in second stage Spontaneous delivery	1
(6) Prolapsed cord Version	1
(7) Monster Version	1
(8) Unexplained 1 Scanzoni, 1 bag induction, and 1 low forceps for fetal embarrassment	3

Five cases, numbers 2, 3, 4, 6, and 7 in the table, were not due to the position, but to accidental causes occurring in the pregnancy or during the delivery. This leaves eight cases due to the delivery or a corrected fetal mortality of 3.01 per cent in a total of 265 cases.

From the table giving the various procedures it is clear that the Scanzoni maneuver is preferable to others in our hands, though we do not feel that any one procedure is adapted to all cases. If the head is deep and fixed in the pelvis manual rotation is not the most desirable technic unless there is an arrest; in the more roomy part of the pelvis it is probably preferable. Often two procedures are attempted on the same patient, one being more easily performed than the other. Below is given our technic for the Scanzoni double application. Since right occipitoposterior is the most frequent, the technic in that position will be described:

(1) The patient is aseptically prepared and placed in the lithotomy position, where the heart tones are elicited; 4 per cent mercurochrome is instilled into the vagina and sprayed over the lower abdomen, inner surface of thighs and the perineum. If the membranes are intact, they are now ruptured artificially.

(2) The bladder is emptied with a catheter, an enema having been given earlier in labor.

(3) An ethylene or ethylene and ether anesthetic is given.

(4) The patient is examined to determine the degree of rotation and station of head. This is confirmed by the location of the anterior or posterior ear.

(5) The vagina is ironed out by the Potter technic.[12] In the hospital an episiotomy in primiparae may be preferable, or may be used in conjunction with the former procedure.

(6) The right hand is then passed into the vagina between the cervix and the head, anterior to the left sacro-iliac synchondrosis and the left blade is introduced, an effort being made to see that the head is flexed along the occipitomental diameter. The right blade is next introduced to a point opposite the left blade. The heart tones are observed after each blade is in place and again after they are articulated (*Fig. 3-a*).

(7) Being satisfied with the application, the forceps are gently pulled in the axis of the pelvis. If descent does not take place, the handles are gently rotated to the left, followed by more traction until the head has rotated through an arc of 135 degrees so that the occiput rests behind the symphysis. With this the pelvic curve of the forceps is reverse to the curve of the mother's pelvis.

(8) The forceps blades are then taken off and reapplied with the pelvic curve up (*Fig. 4*). The last maneuver is that of extension, the forehead, face and chin being born.

Should there be a tendency for the occiput to rotate back around to its original position, a volcellum may be used to grasp the scalp[9] and

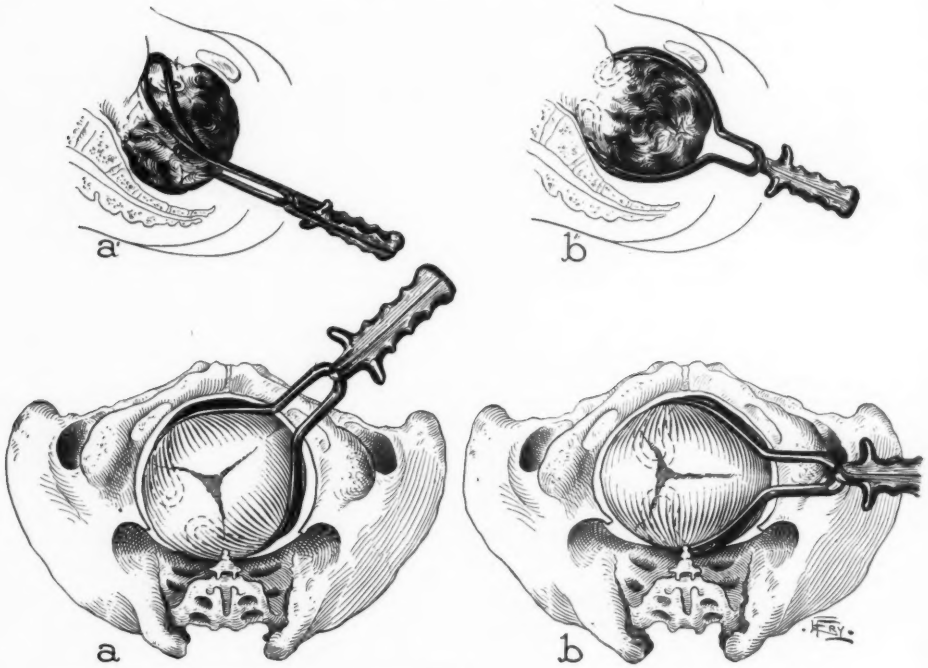

Fig. 3

Scanzoni maneuver. First application of forceps:
a a', Forceps in position to begin rotation and traction; and
b b', Head rotated 45 to occiput transverse position.

hold it while the blades are being reapplied. Better than this, however, is to have a second pair of forceps at hand according to the recommendation of Seides.[13] In this procedure the blade in the right side of the pelvis is removed and the right blade of the second pair inserted, then the left blade is removed and the left one of the second pair is applied.

When the occipito bregmatic diameter impinges itself between the two ischial spines it is necessary to relieve the impaction with the hand or with forceps. The forceps can then be applied with the pelvic curve towards the fetal occiput if the saggital suture remains in the transverse diameter, or the double application may be used, especially should the occiput rotate backward to the sacro-iliac synchondrosis.

The procedure for the left occipito-anterior positions is identical except that the left blade is applied first. The technic described above is in keeping with the normal mechanism of internal rotation. As the head descends rotation is brought about by the occipital region striking the pelvic floor, causing it to rotate to the forward pelvic wall. Sellheim demonstrated years ago with his flexible rod and cylinder that such a movement takes place. Recently Mohr[14] has done work to confirm this.

The important prerequisite for the success of any procedure is a well engaged head. Scanzoni recognized this when he said:

". . . we consider inadvisable such attempted rotation in cases of high standing heads, inasmuch as our method is not advised for such cases. But for heads placed deep in the pelvis it is very easy to put into practice and fully without danger; we would place it, on the basis of our experience, in the front rank, provided the conditions are favorable."[11]

It is felt in this matter, however, that it is absolutely necessary to make an accurate diagnosis of the position before such a procedure is attempted and then only when sufficient time has been allowed for spontaneous rotation. One should always bear in mind that the simpler the procedure the less danger there is to the fetus and maternal soft parts. As a routine for all cases, in the hands of one like Bill, forceps rota-

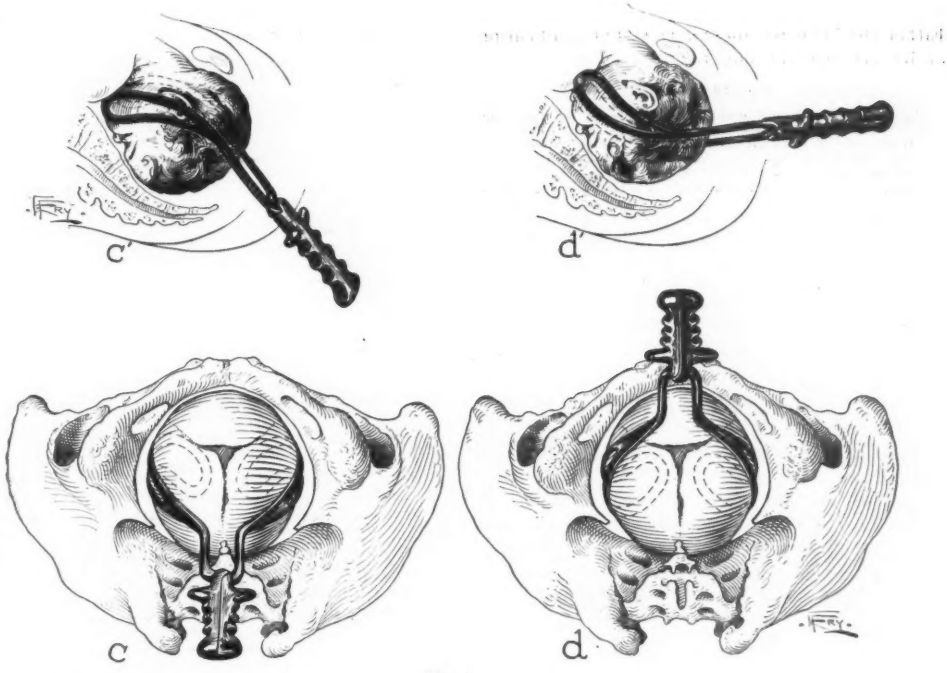

Fig. 4

Scanzoni maneuver.
c c', First application. Occiput rotated 135, pelvic curve of blades reversed.
d d', Second application. Forceps reapplied with pelvic curve up.

tion is entirely safe, but for those who have an occasional case the safest method is watchful waiting, delaying interference as long as is compatible with safety. To wait too long is dangerous and to interfere too soon is equally bad.

Time is too short to review in detail other methods, but let me say that there are cases in which the Kielland forceps or version may be used to an advantage. Also in cases in which the second stage has been in progress for a long time and the occiput has rotated into the hollow of the sacrum, we feel it safer and less dangerous to mother and babe to deliver these with the occiput posterior, possibly using an episiotomy.

SUMMARY

(1) Occipitoposterior positions, because of their relative frequency, remain a major obstetrical problem.

(2) An accurate diagnosis is absolutely essential for proper handling of these cases.

(3) The original Scanzoni technic called for rotation of the head without traction at the level at which it was found, rotation through 45 degrees bringing the saggital suture in line with the transverse diameter of the pelvis. Our modification of his technic is that of descent and rotation through 135 degrees to place the occiput beneath the symphysis.

(4) The Scanzoni maneuver is not adapted to all cases. Manual rotation may be attempted first and if it is unsuccessful the Scanzoni maneuver, Kielland forceps or version may be tried. If the occiput has rotated posteriorly into the hollow of the sacrum, it is probably better to deliver as such either with or without instrumental aid.

(5) Watchful waiting is the keynote to success in occiput posterior positions. Allow one and a half to two hours in the second stage if maternal and fetal conditions permit and see that the head is well in the pelvis. Do not wait too long nor interfere too soon.

(6) Deep transverse arrests can be handled only after the impaction has been released.

Either the Scanzoni maneuver or one application of forceps may be employed.

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Pere Marquette Bldg.

DISCUSSION (*Abstract*)

Dr. James R. Garber, Birmingham, Ala.—Perhaps the only possible major issue that may be taken with the essayist is on the time equation, or when to interfere. Delay in delivering posterior positions invites complications of more formidable nature than the original one of occiput posterior. Fetal and maternal distress, retraction and contraction ring, tetanic uterus and impaction arise to harass the procrastinator. Then, when artificial methods of delivery are performed, perhaps the mother, and certainly the child, are in greater shock and are not calculated to be good surgical risks. Text-books and current literature tell of the frequency of spontaneous rotation in posterior positions. My observation in Alabama runs counter to such dictums, as the babies in posterior positions down there seem to live up to the translation of the word "Alabama," namely: "Here we rest." Another consideration in discussing delay is the type of the patient, whether she be private or clinic. Personally, I am not insensible to this point; yet I do not fail to observe the keynote of conservatism.

The question of manual dilatation of the perineum or an episiotomy leaves but one choice in my experience, and that is episiotomy in every primipara.

Traction on the forceps should be delayed until the vertex is on the perineum. The preliminary work with forceps has but one objective and that is rotation. Too early traction thwarts the beneficence of instruments and superimposes upon the pelvic structures and fetal head unnecessary and dangerous hardships. As Dr. Reddoch stresses, the operator must be content to simulate the mechanism of internal rotation and not employ forceps to establish a challenge between brute strength and common sense.

Finally, the art of delivery presupposes the obstetrician to be a good mechanician. Inasmuch as talents differ, each mechanic must select the tools best adapted to his qualifications and vary the blue print of action accordingly.

Dr. M. Pierce Rucker, Richmond, Va.—Occipito positions cause more obstetrical consultations than any other condition; at least that has been my experience. In 5,254 of my cases in which the position is noted, right occipitoposterior position occurred 928 times (17.66 per cent) and left occipitoposterior position 471 times (9 per cent). Of course, not all of these 1,398 occipitoposterior cases cause trouble. If one makes a vaginal examination just as the head is emerging from the cervical canal, he will nearly always find it in a transverse position. It matters not whether it started as an occipito-anterior or an occipitoposterior position. The occipito-anterior positions readily rotate again to anterior position, as the fetus approaches the pelvic outlet. The majority of the occipitoposteriors continue rotating as the head descends so as to bring the occiput under the pubic arch. Some, however, stay in this transverse position and some rotate posteriorly. This is most probably due to a constitutional inferiority of the genital apparatus. Stigmata of this condition are seen in the narrowing of the transverse diameter that Thoms finds frequently in these cases, in the frequency of contraction rings and in the short broad phalanges. This latter is especially noticeable in the thumbs. I have called attention to this so frequently in consultation that many of my physician friends, when calling me in consultation, say they have another one of those broad-thumbed women that they want me to help them with.

In treatment, the Kielland forceps are ideal. Since this instrument became available, I have rarely done a Scanzoni operation. In fact, the double applications of forceps that I do now are due to mistaken diagnoses. If the head does not readily rotate I remove the forceps and make another examination with the whole hand. I find one of two things: either the position is just the opposite to what I thought it was or else there is a contraction ring. The forceps are re-applied and if there is a contraction ring, the patient is given 0.5 c. c. of 1-1000 epinephrine solution hypodermically. The rotation and extraction then become surprisingly easy.

Dr. P. E. Thornhill. Norfolk, Va.—I rise mainly to say a word for the Barton forcep in the type of case under discussion. Dr. Reddoch favors the Scanzoni maneuver, Dr. Rucker favors the Kielland forceps, and others have their favorite but different way of dealing with an identical condition. Physicians have always been highly individualistic in their choice of instruments.

The objection to the Scanzoni maneuver is the reapplication of blades. And with the Kielland forcep there is some difficulty and danger in rotating the anterior blade in the bladder region after it has been inserted.

As you know, the Barton forcep is the new instrument with the blades at a lateral angle with the shaft and the anterior blade jointed. In cases of arrest at the brim, either in transverse or posterior positions, this jointed blade can be inserted posteriorly and then wroked around to its anterior position with ease and

without upward displacement of the head. The other blade is easily inserted posteriorly because its curve corresponds to the sacral curve. If the diagnosis of position is accurate, there is seldom difficulty in getting a good cephalic application.

Rotation is then accomplished by turning the handles of the instrument along one thigh. Once the head is in correct anterior position, little force is usually necessary to extract. But both rotation and extraction can, as a rule, be done with but one application of the forceps, which is its important advantage.

I would emphasize, as Dr. Reddoch has done, the prime importance of diagnosis. We must know the cause of the dystocia and the position of the head. Failure to diagnose accurately and the disastrous attempts at delivery by force are entirely too common. I also approve his conservatism in waiting two hours in the second stage for spontaneous rotation, providing both patients continue in good condition. Then when interference does become necessary, I think some of you may find the Barton forcep helpful.

Dr. W. T. Pride, Memphis, Tenn.—I have never been an adherent of the Scanzoni method and for the past four or five years have corrected occiput posterior positions in somewhat the same manner as described by Arthur Bill of Cleve'and. This method is so simple and easy of execution that occiput posteriors are no longer difficult.

We find that 72 per cent of cephalics upon entering the pelvis are either right or left occiput posterior and must be changed either by a long labor, forceps or manual rotation.

Dr. Reddoch (closing).—We have had very little experience with the Barton forceps, and our results with the Kielland forceps have not been so uniformly good as with the modified Scanzoni. Let me emphasize again the value of the second pair of forceps when re-applying, according to the recommendation of Seides.

AMAUROSIS FOLLOWING THE TOPICAL APPLICATION OF ETHYL HYDROCUPREIN IN ACUTE SEPTIC SORE THROAT*

By EDWARD W. GRIFFEY, M.D.,
Houston, Texas

Amaurosis from ethyl hydrocuprein is a subject of increasing interest because of the general use of the drug in the treatment of pneumonia. The poisonous symptoms are those of quinine, but amaurosis has occurred in so many instances from therapeutic doses that it behooves us to be on the alert. Numerous observers have described the syndrome of toxic quinine amblyopia and a few cases of ethyl hydrocuprein blindness are on record.

*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

Adler[1] reports one case after only two 4-grain doses. At the Rockefeller Institute, after four 7.5 grain doses at eight-hour intervals, a patient was unable to distinguish light for six days, and at the end of five months, as reported by Weeks, has slightly reduced fields of vision with color vision very indefinite, many of the retinal arteries narrowed and their walls irregularly thickened, the optic discs and retinae pale.

De Schweinitz[2] stated that the blindness following the use of toxic doses of ethyl hydrocuprein (optochin), especially in the treatment of pneumonia, resembles in all respects that of quinine amblyopia. Ball[3] found 53 cases of optochin amblyopia in ophthalmic literature up to 1919. He described the phenomena of central relative color scotoma and stated that the pupils may be widely dilated for days or weeks, with or without the occurrence of amblyopia. Several cases are on record of serious consequences following the free drinking of spirits, after large doses of quinine sulphate had been taken. The repetition of even small doses of quinine may be dangerous to a patient who has an idiosyncrasy to the drug. It is important to remember that once signs of quinine blindness have appeared, there is always the danger of a relapse after the use of doses of the drug which previously would have proved harmless (Elliott[4]). Cross[5] reported a group of 126 cases treated for pneumonia which showed no unfavorable eye complications, and Baldwin and Rhoades[6] published a smaller series (53 cases) also free from disturbances of vision. There have been, however, a few cases of profound visual impairment. The case reported by Alvis[7] had not recovered serviceable vision at the time of his report. The one reported by Swab[8] made an excellent recovery except for restricted color fields for red and green after having been given 40 grains (2.59 gm.) of ethyl hydrocuprein according to Mendel's method. Herman Knapp[9] reported three cases of quinine amblyopia in 1881. He stated that visual disturbances from quinine were recorded as long ago as 1847. It has been the opinion of some observers[10] that quinine amaurosis is not caused by the drug alone, but that such conditions as malaria or pneumonia have rendered the visual apparatus more susceptible to the deleterious effect of the quinine. Against this opinion is the fact that the exact clinical picture of quinine amaurosis can be produced experimentally in healthy men and animals (dogs). The problem of drug idiosyncrasy has received scant attention, but it

must certainly be considered in the case which I am presenting.

J. R. S., a strong, well-nourished white man, 43 years of age and foreman in an oil field, was admitted to the Houston Eye, Ear, Nose and Throat Hospital January 25, 1932, with the diagnosis of acute septic sore throat. Throat culture revealed numerous 24-hour colonies of pneumococci and for this reason the attending laryngologist swabbed his oral pharynx and tonsil mucosae with a 1.0 per cent solution of ethyl hydrocuprein (optochin). One daily application was made on three successive days. On the fourth day the patient's pharynx became worse and it was decided to increase the strength of the application to 5.0 per cent. That same night, January 28, 1932, the patient suddenly discovered that he was blind in both eyes. The following morning he was unable to distinguish light, the pupils were widely dilated and fixed, the disc margins were blurred and the retinal vessels were almost obliterated. During the next two days the discs became chalky white, the retinae a pale rose color and the blood vessels thread-like.

Meanwhile, the patient was acutely ill due to bronchopneumonia complicated by an acute nephritis. The urine was scant and heavily loaded with red blood cells, albumin and casts. Before he became comatose, the patient's vision improved to counting fingers at three feet. His fields were greatly contracted in both eyes. No signs of nephritic retinitis appeared. A careful chemical analysis of the urine, blood and spinal fluid, obtained a few hours after the onset of blindness, showed no trace of the drug. The patient died six days after the onset of blindness from pneumonia complicated by acute nephritis. Before death, his fundi retained their pallor and the retinal vessels remained as small red lines. Definite white streaks appeared at a deeper level than the blood vessels and extended in parallel waves along the course of the arteries.

I have been unable to find a case on record of amblyopia following the topical application of ethyl hydrocuprein or any other quinine derivative. As accurately as I can estimate it, this patient had not more than eight grains of the drug applied to his pharyngeal mucosa in four days. He had lived for years in malarial regions in the South and according to his history had repeatedly taken large doses of quinine without ill effects. It seems likely that, due to a severe acute nephritis, which occurred early in the course of the septic process in the throat, he was unable to eliminate the drug by the usual channel. If his kidneys had functioned properly the patient probably would have escaped amblyopia. As no urine tests were made before application of the ethyl hydrocuprein, it is uncertain what effect the drug itself had on the kidneys, but so far as I know even in large doses it usually has no deleterious effect upon these organs. It seems unlikely that a patient who could take large doses of quinine without injury should be sensitive to a drug so nearly allied to it in chemical and physiological action as is ethyl hydrocuprein. However, the evidence in this case points to the possibility that this man was susceptible to this drug and not to its precursor, quinine.

The hydrochloric acid contained in the gastric juice converts the base into the soluble hydrochloride. For this reason Mendel[2] in 1916 proposed his celebrated method of controlling the absorption of the drug by giving milk with each dose. Most clinicians follow his teachings. The correct therapeutic dose, according to Cross,[5] in the treatment of pneumonia is 4 grains (0.3 gm.) every five hours. It was shown that ethyl hydrocuprein is present in the blood stream in quantities sufficient for pneumococcidal power six hours after 13 doses of 4 grains each have been given, while 12 hours after 15 doses have been given the serum no longer possesses this power.[6]

Smith and Fantus[11] determined that ethyl hydrocuprein and quinine are essentially the same by qualitative analysis, but that quantitatively they are different. They expressed the opinion that ethyl hydrocuprein is more toxic.

Prior to 1910 this drug had many ardent supporters in the treatment of pneumonia. However, it was losing in popularity until in 1914 Morgenroth and Levy[12] published an article which created great interest in ethyl hydrocuprein in the treatment of pneumonia and pneumococcic infections. Since 1916, ethyl hydrocuprein has practically supplanted all other quinine preparations in the treatment of pneumonia. It was demonstrated that this drug possessed greater pneumococcidal activity than any other quinine product,[12] and in 1925 Baldwin and Rhoades[6] showed in a series of experiments that pneumococcic properties of ethyl hydrocuprein are effective on all four types of the pneumococcus. Uhthoff[14] published statistics in 1916 to show that visual disturbances occur in 2 to 4 per cent of all patients treated with ethyl hydrocuprein. That same year Mendel[16] issued his observations on the use of ethyl hydrocuprein in pneumonia, controlling the absorption of the drug by giving milk with it as an acid neutralizing medium. Although one of his patients developed transient amblyopia, there was no visual impairment after 24 hours, even when the treatment was continued.

De Schweinitz[17] found, in experiments on dogs, that doses of quinine from 1 to 4 grains per pound would produce blindness in from 3 to 14 hours. One of the animals remained blind in both eyes for 29 days. By repeating the

quinine medication at intervals, total blindness could be maintained. Swab[8] states that in experiments on healthy human volunteers toxic doses of quinine brought on typical ocular symptoms of quinine poisoning.

Post[13] published a report of a recent case of temporary blindness from retinal angiospasm which was being treated for swamp fever. Blindness came on suddenly following the ingestion of one gram of quinine; the fundus reflex was a pale rose, retinae and discs were slightly congested, tension was very low. The vision began to return on the third day when it was discovered that the field was much contracted and the corneal sensibility was diminished. By the seventh day, ocular tone, fields and normal corneal sensation had returned. The retinal arteries and veins slowly returned to their normal size and the fundi became entirely normal in appearance after three weeks. This case is cited as a typical example of transient quinine amblyopia induced by a relatively small dose of the drug. Many such cases are recorded. However, there are relatively few cases in the literature of toxic amblyopia following the use of ethyl hydrocuprein. Alvis,[7] in 1929, reported a typical case of amaurosis following the ingestion of ethyl hydrocuprein in the treatment of pneumonia. The drug was given with milk, according to the teachings of Mendel, in doses of 4 grains every 5 hours for 3 days. A total of 58 grains had been taken before the onset of blindness. Total blindness lasted ten days, after which there was a slow but imperfect restoration of vision. Central color scotoma was found long after form fields and central vision had been recovered, although reading was quite difficult.

It is De Schweinitz's[2] theory that the presence of central color scotoma can be explained by the action of quinine directly upon the ganglion cell layer of the retina and that this leads to ascending degeneration of the nerve fibers of the optic nerve. However, it seems more likely that the degeneration of the nerve fibers is due to spasm of the retinal arteries (ischemia).

The typical case of amaurosis due either to the toxic effect of quinine or its derivative, ethyl hydrocuprein, is as follows: blindness comes on suddenly in both eyes following the ingestion of the drug. Light perception may be entirely lacking for several days; the pupils are either moderately or widely dilated and react sluggishly to light. At first there may be a moderate retinal edema and blurring of the discs, but very early a generalized retinal angiospasm develops which lasts for days or weeks. In this stage the retinal vessels appear as mere threads and the fundus reflex a pale rose; the discs at the same time become chalky white and the margins sharply outlined. The presence of a red spot in the maculae has been described in about half of the cases reported. Lowered ocular tone, reduced corneal sensibility and the presence of white lines extending along the course of the retinal arteries have been described in a like proportion of reported cases. Duggan[18] reported several interesting cases of quinine amaurosis occurring in patients in India who were under treatment for malaria. He describes what is known as the paradox of quinine amaurosis, namely, visual improvement occurring at the time when the contraction of the retinal vessels is most marked, coincident with the appearance of distinct white lines along the course of the blood vessels. This finding has been reported a number of times by different writers, but no explanation has been advanced.

It was found that certain histological changes were constant in the sections studied. Those made from the eyes of De Schweinitz's[2] dogs showed the following: thickening of the walls of the central artery and vein (endovasculitis); organization of a clot, the result of a thrombus; widening of the infundibulum of the vessels as the result of the constriction of the surrounding nerve fibers; and finally, practically complete atrophy of the visual pathway, including the optic nerve, optic chiasm, and optic tracts as far as they could be traced. Likewise he observed that the direct effect of quinine is on the vasomotor centers producing constriction of the vessels; that changes in the vessels themselves are set up, owing, perhaps, to an endovasculitis; though thrombus may occur, the late result is an extensive atrophy of the visual tract.

Holden[19] found the most profound changes in the retina. His experiments were also upon dogs given toxic doses of quinine from three to forty-one days. Using special staining methods he was able to demonstrate changes in the ganglion cells; vacuolation, uneven staining of the chromophilic granules, nuclear displacement and finally, in more profound cases, almost complete degeneration of the entire ganglion cell layers of the retina. Also he observed thinning out, in places, in the nerve fiber layer, and among the fibers were found globules of a myelin-like character. The optic nerves stained by Marchi's method showed marked degeneration of the myelin sheaths in long-standing cases. Therefore it was concluded that the process in quinine amblyopia is one of degeneration of the nerve fibers and ganglion cell layers of the retina, due to insufficient nourishment from constriction of the retinal arteries. Following this there is an ascending atrophy of the optic nerve fibers.

Forster[15] used rabbits with special reference

to the effect of ethyl hydrocuprein hydrochloride and found they could tolerate large doses of quinine and ethyl hydrocuprein hydrochloride without apparent toxic effect. None of his animals displayed any corneal anesthesia, dilatation of the pupils, ischemia of the retina, constriction of the retinal vessels or other evidence of visual disturbance. However, in the retina the ganglion cell layers showed vacuolation of the cells, protoplasm and nuclei, with a breaking up of the chromatim, loss of the nuclear wall, a decrease in the number of ganglion cells and the appearance of hyalin-like bodies.

SUMMARY

(1) Ethyl hydrocuprein, a synthetic derivative of quinine, is still widely used in pneumococcic infection. Those who prescribe it should be familiar with its dangers to the visual pathways. The toxic action is due to a spasm of the retinal vessels, causing ischemia of the retina. Degenerative changes occur in the ganglion cell layers of the retina, and if severe they lead to ascending atrophy of the optic nerve fibers. Depending upon the severity of the reaction the final visual results grade from complete recovery, through relative or absolute scotomata, constricted visual fields, to complete and permanent amaurosis.

(2) The toxic action of the drug upon the visual apparatus may be due to drug idiosyncrasy in a susceptible individual, or to faulty elimination in a non-susceptible one.

(3) The case reported is one of complete amaurosis in an individual with damaged kidneys, who received not more than eight grains of the drug by topical application to the pharyngeal mucosa.

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DISCUSSION (*Abstract*)

Dr. T. J. Dimitry, New Orleans, La.—Dr. Griffey's case differs very materially from others reported, in that a limited use, three applications once daily of a 1 per cent solution of ethyl hydrocuprein, to the oral pharynx produced blindness.

I am interested in agents that provoke vasomotor changes. Ethyl hydrocuprein produces a contraction of blood vessels within the eye, an action at times very much to be desired.

I hope to learn more about the fundamentals of the toxic action, particularly the effect observed by histological examination on the ciliary vessels. Though we know the condition of the retinal vessels, the ciliary does not appear greatly injured.

This report confirms De Schweinitz's observation that the effect of ethyl hydrocuprein resembles quinine amblyopia. The small dosage and the fact that blindness resulted after applications to the pharynx make it of unusual interest. There may have been an idiosyncrasy to the drug, but the patient had previously been able to take large doses of quinine. Administration with milk controls absorption, and when dissolved in the oils and fats it may be readily taken up by the tissue, particularly the tissue of the pharynx.

Dr. Griffey (closing).—The question of eighth nerve involvement has been investigated, but so far as I have been able to learn, there is little information available. Certainly quinine deafness is a real clinical entity and we have ample evidence of the profound effect of this drug on both the second and eighth nerves in susceptible individuals. There was no deafness elicited in this case during the toxic stage of amaurosis or before the patient died.

I feel that there must be other unreported cases of toxic effects following small dosages of optochin. The cases in the literature available are not many.

UPPER RESPIRATORY TUBERCULOUS COMPLICATIONS OF PULMONARY TUBERCULOSIS*

By GEO. H. B. TERRY, M.D.,†
Oteen, North Carolina

Tuberculosis of the lungs is a disease that may run its course to definite arrest or to a fatal termination without invading any other organ of the body. Frequently, however, secondary lesions develop elsewhere. The intestines, the epididymis, the meninges of the brain and the upper respiratory tract are the localities where its secondary manifestations are most prone to occur, though exceptionally they may

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†Veterans' Administration Facility.

develop in any structure of the body, except the hair, nails, teeth and the crystalline lens. The relative frequency with which the various structures are involved varies widely and is only to be determined by the study of a large number of cases. The conclusions to be stated in this paper are based on the study of an average of over six hundred cases a year for a period of eight years; no children are included and only about 5 per cent of the patients are women. All have been war veterans and the most of them in the second, third or fourth decades of life.

In considering the tuberculous lesions of the upper respiratory tract, complicating pulmonary tuberculosis, let us direct our attention first to diagnosis. Smears taken from these lesions give us little if any help. The lesion may be non-tuberculous and the smear positive for the tubercle bacillus, due to sputum contamination, or the smear may be negative and the lesion tuberculous, due to the fact that the organisms lie deep in the tissue and do not appear in the smear.

A biopsy, save in exceptional cases, should not be done. It is not free from danger and usually is not necessary. Should it be deemed necessary the wound should be at once cauterized, using the actual cautery, or else remove the tissue with the electrosurgical knife, which seals the vessels at the moment they are severed.

The best method of determining the character of the lesion is by its clinical appearance and by considering the relative frequency of tuberculosis in the organ under consideration.

This method presupposes that the diagnostician shall have had the advantage of considerable clinical experience, shall have studied tuberculosis rather than books about tuberculosis. In the proper study of tuberculosis autopsies are imperative, and the lesions should be studied by the microscope. By this method one can check his diagnoses and can, in time, learn to anticipate the laboratory findings just as the trained pathologist usually has a fairly good idea of what his microscope will show from the gross appearance of the specimen alone. The laryngologist should work in conjunction with the internist. Tests for syphilis and urinary examinations should be done as a matter of routine.

Of the upper respiratory organs we shall first consider the nose and sinuses. We have had but one case in which the nose was affected, the lesion involving the skin at the nasal orifice and the nasal mucous membrane for a short distance. This extended very slowly and the patient died from other causes before suffering much inconvenience from it.

No case of tuberculosis of the sinuses has been seen. In perhaps a half dozen patients we have had reports of tubercle bacilli in antrum washings. In none of these patients has there been any clinical evidence of serious sinus disease and some of them showed no evidence of sinus disease of any degree. Sputum contamination was probably responsible for the findings.

Tuberculosis of the tongue is of frequent occurrence. It appears as a small ulceration, is usually moderately painful and extends slowly. The prognosis is good, as it yields to treatment better than any other tuberculous lesion under consideration.

Any patient with pulmonary tuberculosis and a negative Wassermann who develops an ulcer on the tongue should have it treated with nitrate of silver or some other similar application for ten days or two weeks. If it is a simple ulcer it will be healed in that time. If not, the differential diagnosis is between tuberculosis and malignancy, with the chances better than fifty to one that it is tuberculous. Perhaps the most scientific method would be to do a biopsy, and I might add that to determine whether or not a patient has intestinal tuberculosis the most scientific method would be to open the belly and do a biopsy on the gut. In my opinion, neither of these procedures is justified and unless there should be some special reason to suspect malignancy the ulcer should be considered as tuberculous and cauterized with the actual cautery. In over fifty cases we have had but one that did not do well under this treatment, and in this one a biopsy had been done against our advice. I might add that we have seen no cases of malignancy of the tongue, which is perhaps explained by the fact that but few of our veterans had reached the age where it is usually found.

In the region of the tonsil, tonsil pillars and soft palate our experience has been as follows: in doing tonsillectomies on patients with rather far advanced pulmonary tuberculosis, which we do not hesitate to do if the indications are definite and clear, the laboratory reports have shown tuberculosis of the tonsil in about 12 per cent of the patients operated upon. This lesion was always beneath the surface of the tonsil and does not seem to be of serious import as, except in one patient who ultimately recovered, there has been no tendency to extension after the removal of the tonsil and its capsule.

Any patient, however, who has a tuberculous lesion on the surface of the tonsil, the pillars, or the soft palate has by far the most serious complication that can occur in the whole upper respiratory tract. We have seen but one such patient recover, and in this case the lesion disappeared following a cauterization of the larynx.

On the posterior pharyngeal wall tuberculous ulcerations are frequently encountered which are less dangerous and yield to cauterization.

Tuberculosis of the larynx is by far the most common of all the complications under consideration. It occurs probably about ten times as often as tuberculosis in the tongue or in the pharynx. In fact, it has been present in every case of pharyngeal tuberculosis that we have observed, except one. The prognosis of tuberculosis in the larynx is much more grave than in the tongue, much less so than in the pharynx. On account of its frequency, however, it ranks first as the most serious tuberculous complication of the whole upper respiratory tract. The symptoms depend on the location of the lesion. If in the region of the cords, there is hoarseness. If in the region of the epiglottis, there is pain. This pain is usually first noted on taking citrous fruits. Inspection at first may show nothing definite, but sooner or later there is seen localized swelling or general infiltration, either of which may go on to ulceration. The arytenoids are prone to become edematous, the epiglottis to show marked thickening, the posterior commissure to show proliferations and the cords, if ulcerated, often show a saw-toothed appearance on the margin. In a patient with pulmonary tuberculosis any one of these four findings in the larynx is practically pathognomonic if traumatism can be excluded.

The diagnosis can be strongly suspected if the tuberculous patient has long continued hoarseness, but is by no means definite, as this symptom may be due to general weakness of the laryngeal muscles, to paralysis of a vocal cord which not infrequently occurs in pulmonary tuberculosis, to a benign papilloma of the cord, to syphilis or to an irritation of the larynx due to coughing, or secondary to infected tonsils. Malignancy must also be considered.

The prognosis is infinitely better than before the cautery treatment was introduced and much credit is due Wood and Fetterolf of Philadelphia, Looper of Baltimore, and Greene of Asheville, for being among the first to use and advocate this method of treatment.

The first thing to be done for a patient with known or suspected laryngeal tuberculosis is to insist on absolute voice rest and a routine check at stated intervals. Quite a number of patients with definite laryngeal involvement, some even with ulceration, will yield to this measure alone. If they do not, cauterization should be done. The method we use in cauterization of the larynx and also of the tongue will not be described, as I have already gone into this in detail in a former paper before this Section.* Some laryngologists are enthusiastic about the use of therapeutic light. In our experience the results have not been good.

The cautery is often the best method of palliative treatment of the terminal cases which have atrocious pain. Sometimes, orthoform, or cocaine spray will give temporary relief, but morphia should not be denied as they are approaching the end.

In the treatment of the pharyngeal lesions that I have already described as being almost universally fatal, we have recently done on two patients an operation with the high frequency electric current that has resulted in marked relief of symptoms and a decided improvement in the appearance of the lesion.

One of these patients died later from intestinal tuberculosis. The other is still under treatment with the pain in throat practically gone and the size of the ulceration much decreased. From this experience we believe that electrosurgery should be used in pharyngeal lesions and we hope later to be able to record definite arrest in some cases. It has done better in our hands than any other treatment, and should we succeed in getting nothing more than palliation, we shall continue to use it for this purpose alone. Our operation has consisted of excision of as much of the lesion as possible with the electrosurgical scalpel, after which we go over the adjoining region with a spark obtained by holding the scalpel a short distance away from the surface involved. The spark that jumps the gap sears the area and probably influences the tissues for a greater distance than that obtained by ordinary cauterization. We have not felt that our experience has been sufficient, so far, to warrant using this method in the larynx, but it is perfectly possible that a technic can be devised that will cause us to abandon cauteriza-

*"Cautery in Tuberculosis of the Tongue and Larynx." Sou. Med. Jour., **29**:147, Feb., 1929.

tion, which has served well, in favor of electrosurgery.*

SUMMARY

(1) The best practical method of making a diagnosis of tuberculosis in upper respiratory lesions is by the clinical appearance.

(2) Biopsies should be avoided, unless there is special reason to suspect malignancy.

(3) The most frequent sites are the larynx, the tongue and the pharynx.

(4) Laryngeal tuberculosis is the most common, pharyngeal tuberculosis the most fatal form, while the lesions of the tongue, if properly treated, usually recover.

(5) Voice rest and electric cauterization are the only methods that have given us good results in laryngeal tuberculosis.

(6) The high frequency current has proved most useful in relieving the pain of pharyngeal lesions.

DISCUSSION (*Abstract*)

Dr. Richard W. Wilkinson, Washington, D. C.—I agree with Dr. Terry that smears are of little value, biopsies should be avoided and that experience diagnoses lesions by clinical appearance in most cases. X-ray studies have brought interesting information about the difference between tuberculous and luetic lesions in the larynx. Tuberculosis produces a hazy, washed-out shadow due to decalcification. Syphilis, on the other hand, shows sharply marked deposits of calcium about the edges of the gumma.

Involvement of the nose is most infrequent in my experience. Dr. Terry mentions only one case of nasal tuberculosis and that lesion involved the skin and the mucosa for only a short distance. Nearly every textbook mentions that anterior perforations of the cartilage of the nasal septum are tuberculous in origin. I have never seen a case in which the septal perforation was proven to be tuberculous as a primary lesion or as a complication of pulmonary tuberculosis.

Laryngeal involvement is the most frequent complication of pulmonary tuberculosis in the upper respiratory tract, and mouth lesions about the pillars of the tonsil and the soft palate are almost invariably a fatal complication. By far the most satisfactory treatment in laryngeal cases is vocal rest and electrocautery. At times, chaulmoogra oil and ultraviolet light are used and seem beneficial.

Occasionally an injection of the superior laryngeal nerve is done, some of which are satisfactory. I should like to ask Dr. Terry if he has had any experience in the resection of the superior laryngeal nerve to relieve intense pain. In general, I have noticed that in patients who were subjected to artificial pneumothorax the laryngeal condition is improved. We have not used the electrosurgical scalpel or high frequency current on any lesions, but this procedure is very rational and should prove a valuable addition to our armamentarium.

Every patient suffering from pulmonary tuberculosis should have a periodic laryngeal examination, whether or not there are laryngeal symptoms.

Dr. Alfred Blumberg, Oteen, N. C.—It is generally taken for granted that laryngeal tuberculosis is the outcome of contact infection, a similar assumption as that advocated in connection with intestinal tuberculous disease. Neither histologic preparations nor clinical considerations justify such theories. The fact that tubercle bacilli containing sputum passes over certain anatomic structures does not suffice to create histologic changes in the deeper layers of these parts. One can clearly follow the changes which begin at a fair distance beneath the covering epithelium which remains unbroken as long as neither nutrition is completely cut off from the cells nor toxic influences from the near-by lesion created necrobiotic changes within this layer. When, however, disturbance has taken place the layer becomes elevated, later loose, and separates itself from the neighboring structures and finally cellular disintegration is followed by ulceration. A large series of specimens examined convinced me that the original laryngeal tuberculous deposit may be many millimeters beneath the covering epithelium and this fact fails to support the etiology of contact infection. Furthermore, the number of patients having laryngeal tuberculous complications is not in keeping with the vastly greater number of patients who have tuberculous sputum and no tuberculous laryngitis. To assume that a special tendency to acquire this complication exists with certain individuals is not justified. As it is, there can be no further doubt that tuberculous disease produces intermittent bacteremia which is responsible for the progression of the disease as well as it is for such complications as renal, laryngeal and intestinal tuberculosis. The organisms lodge themselves in fine branches of vessels and unless sufficient pressure exists to dislodge the bacilli before damage is created by them, the result is a new tuberculous extension. I believe this to be the origin of tuberculous laryngitis.

Dr. Terry (closing).—We have not encountered the lesions under discussion as primary lesions. We believe them to be possible, but extremely rare. Several times, however, patients have been sent to us in whom no tuberculosis has been found on the preliminary examination. We have found, sometimes, lesions in these patients that in appearance were so typically tuberculous that we have asked for a re-examination, and this re-examination has usually located a focus. In one of our patients an x-ray of the spinal column revealed an involvement of a vertebra that had given no symptoms. A diagnosis of laryngeal tuberculosis and tuberculosis of the spine was then made and confirmed by the subsequent history of the case.

In our experience perforations of the nasal septum of tuberculous etiology are comparatively infrequent, and seem to occur with no more frequency than in other debilitating conditions, such as enteric fever.

We have not resected the superior laryngeal nerve for

Author's Note.—Since this paper was written we have treated several additional cases of pharyngeal tuberculosis with the high frequency current and have succeeded in obtaining definite arrest of the disease process in a few and marked relief in all.

Using a home-made electrode, as nothing suitable was found on the market, we are now using the same method in laryngeal lesions. The results have been so satisfactory as to justify reporting in a subsequent paper which will appear later when our series is sufficiently large.

the relief of pain. Formerly, we injected quite a few with alcohol and occasionally with remarkable results, but in the large majority of cases there was little, if any, relief from pain. We have practically abandoned the procedure, believing that the actual cautery, or the high frequency current is usually the best method, not only for the arrest of the disease, but also for its palliation.

GASTRO-INTESTINAL ALLERGY*

II. CONCERNING THE MIMICRY OF THE PEPTIC ULCER SYNDROME BY THE SYMPTOMS OF FOOD ALLERGY

By HERBERT J. RINKEL, M.D.,
Kansas City, Missouri

Food allergy has only recently received the consideration it deserves in the differential diagnosis of alimentary tract disease. This has been due in a large part to the writings of Vaughan,[1] Rowe,[2] Eyermann,[3] Duke[4] and others,[5] who have emphasized the frequency of food sensitization as a cause of abdominal symptoms. Duke,[4] especially, has called attention to the "mimicry" of various abdominal syndromes by the symptoms of food allergy. In this communication the "mimicry" of peptic ulcer and abdominal allergy will be discussed. This diagnostic problem will be illustrated by the clinical record of a patient, who has been under observation for the past six years, and in whose case at least five physicians have made a diagnosis of peptic ulcer, based on symptoms which have since been proven to be due, with two exceptions, to certain foods. Not only has it been possible to reproduce the original symptomatology, but it has also been demonstrated that the effect of various modifying factors has been identical to that recorded at different times during his illness.

CASE REPORT

E. W. R., a man aged 26, has consulted me once or more yearly since 1927 on account of abdominal distress and has been under continuous observation during the past six months.

Past History.—He had always been well until the mid-summer of 1927, when he gradually developed upper abdominal distress, which has continued, with occasional exacerbations, but without any definite modifications in the distress picture up to the present. The diagnoses made in his case are worthy of review.

In November, 1927, these symptoms were diagnosed as acute appendicitis and a normal appendix was removed. Twice in 1928 a diagnosis of peptic u'cer was made and Sippy treatment was given without relief. In December of that year perforating ulcer was suspected and a gastro-enterostomy was done. In March, 1929, he had a postoperative herniation of the ileum through the mesocolic and gastrocolic omentum. At this operation an apparent miliary tuberculosis of the visceral peritoneum was found. In February, 1931, he had intestinal hemorrhage, with distress, considered and treated as ulcer without the expected results, while during February, 1932, a diagnosis of stoma ulcer was made. He then entered a clinic, where the gastroenterostomy was taken down. The abdominal cavity was otherwise normal. Four months later acute intestinal obstruction accounted for his fifth operation in as many years. The role of allergy was suspected in November, 1932, and a few foods were proven to be etiologic. In April, 1933, symptoms returned and a diagnosis of intestinal obstruction was made, but changed. He then returned for further study and has been under continuous observation to this time.

Symptomatology.—The most important and practically constant symptom was abdominal distress, which consisted of several types of pain: (a) crampy, (b) dull heavy, (c) burning, (d) cutting, (e) stabbing, and (f) hunger pain. In addition, there were many acute attacks of pain, two of which will be detailed later.

This distress was located (1) along either costal margin, more often the left; (2) in the mid epigastrium, and (3) over the ascending and descending colon. The last was only occasionally affected. It was seldom referred to the back and was rarely tender to touch. While this distress was worse during the hot summer months and in the mid-winter, it did not exhibit definite periodicity or intermittency. An analysis of a typical day indicated that symptoms were frequently present before breakfast, the effect of food was not constant and often provoked vomiting. Bowel movements usually gave temporary complete relief. On Sippy treatment he was never entirely relieved, although on some occasions he did temporarily improve. In other instances he was made worse or not affected. After each operation he was improved for a short period of time only to have all his symptoms recur. On questioning he was not so definite in his replies concerning the effect of food, alkalis, and so on, as ulcer patients usually are, a thing which is typical of most patients with food allergy symptoms in the abdomen, unless they be quite severe and due to only a few foods. Evidence will be presented to account for this vagueness on the part of our patient.

The acute pain in the upper abdomen in December, 1928, was described by the patient as a rather constant sharp pain two inches below the costal margin and just to the right of the midline. He reported that it was not relieved by alkalis, foods, heat or rest. He was sure that he tossed and rolled with this pain. His surgeon reported that he had had severe upper abdominal pain, which with the history warranted exploratory operation.

The attack of pain in February, 1931, which was associated with hemorrhage followed a day with the usual amount of distress. It began at 9:25 p. m., when the patient felt faint, became nauseated and vomited. He stated that the distress was first a sharp cutting pain for about ten minutes, followed for about thirty minutes by a dull ache located along the left costal margin. This in turn was followed by a crampy pain which continued through the night. It was not

*Read in Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

possible to determine the presence of blood in the vomitus. Blood appeared in the stools for several days.

Laboratory Examinations.—The Ewald test showed a free acid of 78 and a total acid of 108 in 1928. Subsequent tests were within normal limits.

Fluoroscopic examination as well as x-rays revealed a defect on the medial side of the duodenal cap, but on one occasion at immediate operation the duodenum was normal by inspection and palpation.

The blood, urine, chest and allergy tests were of no diagnostic value. The stools contained blood only once.

THE SYMPTOMS OF PEPTIC ULCER

Since the diagnosis of ulcer was made more often than any other, it might be well to consider its symptoms in detail. The discussion will be limited to that of uncomplicated peptic ulcer, for as Sippy[6] has said,

"After one has mastered the clinical facts relative to the distress of uncomplicated ulcer, the modifications in the distress picture produced by the complications of ulcer are seldom confusing."

Gaither[7] has emphasized that distress which is believed to be due to ulcer

"should be studied in close detail from the earliest onset of the primary symptoms, through the ensuing months or years, and the various characteristics, vagaries and changes so frequently observed in this very important pathologic entity should be carefully noted."

Such a study is best accomplished by considering, first, the occurrence of the pain, both in retrospect and as to daily variations; and second, the effect upon this symptom of foods, alkalis, and so on, on clinical trial.

Distress, typical of ulcer, when reviewed has two characteristics, chronicity and intermittency, with seasonal exacerbations. It is more apt to occur in early spring and late fall. Its onset is usually quite definite and as the attacks recur, the period of distress increases and the interval of freedom diminishes until the patient is practically never free of symptoms.

An analysis of a typical day of distress reveals freedom before breakfast, unless the pain has been carried through from the night. Symptoms appear in thirty, sixty or ninety minutes after the meal, gradually develop to a maximum and then wear away, or if severe continue into the next meal with relief and recurrence as before. Usually the pain is stronger after each meal during the day. With retention of food, the patient often awakens overnight with distress which may be relieved by food, alkali or emesis with complete emptying of the stomach.

On clinical trial adequate amounts of alkali and food will relieve the pain for a while. Rest eases it, while heat and catharsis are without benefit.

The characteristic laboratory and physical findings need not be repeated at this time, except to emphasize that ulcer pain is usually finger point, localized in the mid-epigastrium, tender to touch and is often referred through to the back.

THE DIFFERENTIAL DIAGNOSIS

Now, let us compare the symptoms exhibited by our patient with this known disease pattern.

First, the occurrence of the pain differs from that of ulcer in that (1) the onset is vague; (2) there is neither periodicity or intermittency; and (3) the seasonal features are lacking. Yet, the chronicity and the exacerbations make it necessary that ulcer be seriously considered, especially when we recall the hemorrhage of 1931.

A study of a typical day of illness reveals that frequently there was distress before breakfast without any during the night. Eating did one of three things: relieved the pain, increased it or had no effect. Often foods, for instance milk, caused emesis within a few minutes without improvement or relief. Symptoms recurred suddenly and usually with maximal intensity and then gradually wore away. They were not progressively worse during the day.

Clinically, it was found that alkalis and foods relieved the patient at one time and on other occasions were without effect or aggravated his condition. Cathartics gave fairly constant temporary relief. Heat, rest and emesis were of no particular benefit. Elimination of fifteen foods gave him complete and continued relief from his distress. These foods induced symptoms with each ingestion over a period of six months' observation.

On physical examination he was found to have enlarged bluish gray turbinates and he was 25 pounds underweight.

THE DIAGNOSIS OF ALLERGY

Having now shown how this patient's symptoms differed from those of ulcer with which it was consistently confused, and that complete cessation of distress was obtained by eliminating certain foods, it remained for us first to produce symptoms at will, and second to demonstrate that their response to certain modifying factors was the same as that observed before food allergy was suspected. Since this is a controlled case of allergy, such tests are possible. Wheat, egg and milk, being the most important etiologic foods in his allergy, were chosen for these trials.

The Wheat Test.—Ingestion of wheat produced distress within three hours, consisting of dull aching and cramping pains along the left costal margin. There was also a burning pain in the mid-epigastrium just

to the left of the midline. Relief was obtained by eating for ninety minutes, when the pain suddenly recurred with maximal intensity and gradually wore away at the end of two hours. He had distress before breakfast which was relieved on one occasion and increased on another by taking foods. Alkali relieved the burning type of pain completely for a short period of time. Ephedrine and salines gave complete relief within twelve hours.

The Egg Test.—Distress having six characteristics was produced in the course of this trial. They were (1) burning or gnawing, (2) cramping, (3) dull aching, (4) cramping along the descending colon, (5) hunger, and (6) a bloated sensation without actual abdominal distention. Eating relieved all types of distress for one hour, but on second trial increased the symptoms. There was considerable nausea, but no emesis. Distress was present before breakfast and was aggravated by eating. Alkali on one occasion relieved the burning or gnawing type of pain, and on another trial increased his symptoms. As in the case of wheat, ephedrine and catharsis gave relief.

The Milk Test.—Distress appeared within three and a half hours, consisting of: (1) cramping pain over the left costal margin; (2) sharp stabbing pain in the mid-epigastrium; and (3) hunger pains in the same area. There was nausea without emesis. On two occasions he was relieved by taking foods and on two other trials symptoms were increased. On one of these trials he became violently ill within five minutes, developing not only intense abdominal pain crampy in character, but also symptoms of nasal irritation, itching of the roof of the mouth and headache. This persisted nearly two hours and was relieved by taking food. He had distress before breakfast and also during the night, but they were not necessarily related. Bowel movements gave temporary complete relief. Symptoms were finally treated with cathartics and ephedrine with similar results as before.

THE DIAGNOSIS OF ABDOMINAL ALLERGY

A perusal of these findings will reveal all features of the patient's original syndrome, except emesis and hemorrhage. (There was marked nausea.) It is to be noted that both hunger and burning or gnawing types of pain, often present in ulcer, were produced by these foods and that relief was obtained by taking either alkali or foods. It can also be seen that the relation of symptoms to food, alkalis, time of day, and so on, were so variable that there is sufficient cause for the patient to be "vague" about his answers on history taking.

It is not proposed to explain the occurrence of hemorrhage in 1931 on an allergic basis, although this is quite probable. Neither can these findings which support the diagnosis of allergy be used to controvert the existence of ulcer. It is our desire to stress the occurrence; the clinical importance and the possible confusion of food allergy symptoms with those of ulcer if great care is not taken in studying each case. It is our conclusion, based on the evidence presented here, that the "mimicry" of peptic ulcer by symptoms of food allergy is quite superficial. The frequent diagnosis of peptic ulcer in this case is not to be explained upon a similarity of these two conditions, but upon an error in logic, that is, the making of a diagnosis on other than positive findings. On the other hand, during the major portion of this patient's illness, the nature of abdominal allergy was not fully known or generally recognized, and peptic ulcer was the most probable cause of the distress.

SUMMARY

These cases are neither rare nor common. They can be detected if one will consider allergy along with all other possible causes of abdominal symptoms, either acute or chronic in nature.

The presence of allergy should be suspected in those instances where there is a family history of atopic diseases. The diagnosis is enhanced if the patient exhibits other sensitization phenomena or definite symptoms of itching about the nose, eyes, ears, *et cetera.*

These cases can only be diagnosed by the demonstration of a specific relation between certain foods and symptoms, and further, this relation must exist upon each test, properly executed, during the period of sensitization.

Finally, this type of case should not be labeled "allergy" with the idea that it marks the completion of an intellectual quest, but rather as an indicator of our present knowledge of these baffling manifestations whose exact mechanism is still unknown.

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DISCUSSION (*Abstract*)

Dr. Marion T. Davidson, Birmingham, Ala.—Gastro-intestinal allergy is not so rare a condition as many still think. It was comparatively recently that its existence was called to our attention. Most patients who seek a specialist still go to the gastro-enterologist

who has not yet awakened to the significance of allergy in his practice. When the allergist begins to look for it he finds many of his hay fever and asthma cases with gastro-intestinal symptoms as well.

I recently had a patient sent me by a gastro-enterologist who had had five operations: three for removal of various intra-abdominal organs and two for relief of symptoms left by the first three, and still her stomach symptoms had gone on just the same. She gave pronounced reactions to several foods and was much improved by a diet from which those foods were removed and others pushed to take their places. The operations were all done before my gastro-enterological friend had seen her.

There are several leads which will be helpful in deciding when a case has allergic features. First is a history of allergy in the family, but best is a history of other allergic manifestations in the individual patient. The patient of whom I spoke had asthma herself and a brother who came with her had fall hay fever. Ephedrine or epinephrine will help the allergic case. Of course the final criterion is the finding of reactions on skin testing with foods and other allergens.

One last suggestion which I should like to make to the gastro-enterologists is that milk is not the one perfect food which we have for so long thought it to be. Especially is this so in the case of the milk-sensitive allergic individual to whom it is a true poison. It is remarkable how often we see patients on whom all kinds of elimination diets have been tried except elimination of milk. Many have even been put on milk alone only to have their symptoms continue or even increase, and still the milk was continued. Many of these are sensitive to milk and are much improved by eliminating it from the diet.

Dr. Julius Friedenwald, Baltimore, Md.—Food allergy is far more common as the cause of digestive disturbances than is ordinarily recognized. It is well known that such digestive affections as cholecystitis, appendicitis, mucous colitis and peptic ulcer may follow directly upon or be precipitated as the result of inflammatory processes due to food allergy. On the other hand, the fact that an individual is the subject of gastro-intestinal food allergy by no means precludes the possibility of the simultaneous presence of an actual organic digestive disturbance such as ulcer. According to our experience, the history of the allergic case which simulates ulcer is usually somewhat atypical and does not fit in entirely with the usual typical signs. This should at once arouse suspicion of the possibility of the presence of allergy. A searching history, together with a complete physical examination, is of the greatest importance in suspected cases. The sudden increase in the symptoms when the patient is placed upon an exclusive milk diet has at times directed attention to this condition. Numerous instances have been recorded of so-called peptic ulcer which were eventually determined to be due to allergy, the symptoms of which were intensified by the milk and cream diet prescribed in the treatment, which entirely disappeared following its discontinuance. It is likewise quite possible that recurrent inflammation of the gastric mucosa as the result of allergy may lead to actual disease such as ulceration. In our cases, pylorospasm was not uncommonly demonstrated which when prolonged has been known to be followed by this lesion. It must be particularly borne in mind that alimentary allergy may be the direct cause of an ulcer-like syndrome and should be recognized as a factor of importance in the interpretation of certain obscure gastro-intestinal symptoms.

Dr. Rinkel (closing).—I should like to emphasize the fact that gastro-intestinal symptoms other than those due to allergy may be relieved by ephedrine and epinephrine. The fact should constantly be kept in mind in making the differential diagnosis of abdominal symptoms supposedly due to allergy.

MYOMA OF FUNDUS UTERI*

By R. Angus Nichols, Jr., M.D.,
Richmond, Virginia

This case was selected not with the idea of demonstrating anything novel or unusual, but to review one of the common problems encountered in every day practice of surgery and gynecology.

Patient R. S., a white school teacher, 35 years old, presented herself complaining of lower abdominal pain and vaginal bleeding. The onset of the illness began ten days before. On the second day of her normal menstrual period the patient was caught in a rain storm and became wet and chilled. On returning home, she first noticed a low-grade dull, aching pain across the entire lower abdomen. Thinking that she had "taken cold in her stomach," she treated herself more or less palliatively, using the usual household remedies. That evening the vaginal flow became quite profuse and large blood clots were passed. Rather profuse vaginal bleeding continued and five days after the onset the abdominal pain became rather severe. There was a sensation of nausea, but no vomiting. Accompanying this condition, there was rather marked constipation, for which the patient had been in the habit of using epsom salts. She had resorted to this several times during the present illness. Not realizing that the condition was due to anything more than what she thought to be a "cold in the stomach," the family physician was not called until the eighth day of this illness. Hospitalization was advised by him, but the advice was not accepted by the patient. The following day the patient fainted for the first time in her life, and has become progressively weaker. On the tenth day of her illness she was admitted to the hospital, where I first saw her.

The past history revealed the usual childhood diseases with acute rheumatic fever at seven years of age, of six months' duration. Other than this and a tendency to be nervous all her life, the patient had been in good health. There were no other febrile diseases, no injuries and no surgery. At one time she suffered with repeated headaches, which have been entirely corrected by the wearing of glasses. There was occasional epistaxis during childhood, but none since the patient had reached adult life. The patient was last seen by a physician three years before for treatment

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of a sore throat. There was no history of swel ing, tenderness, rigidity or enlargement of the neck. The cardio-respiratory history revealed rather frequent colds, but no cough, expectoration, hemoptysis, dyspnea, orthopnea, precordial pain or peripheral edema. The appetite had always been poor, but there had been no indigestion, sour stomach, water brash, nausea, vomiting or abdominal pain until the onset of the present illness. There has been no change in the patient's weight. The stools are constipated, but have never been bloody, tarry or mucoid. There is a suggestive history of a transient cystitis several years ago; otherwise the urinary system is negative. The menses have a'ways been irregular, having their onset somewhere between the twelfth and fourteenth year; the flow is variable, occasionally lasting as long as eight or nine days, accompanied by menstrual pain, and in recent years she has frequently passed small blood clots. The onset of the last period was coincident with the beginning of the present illness. The patient is single and has never been pregnant.

The family history seems to be unimportant. The mother is paralyzed. The father died of heart and kidney trouble, and there are no other familial diseases.

Physical examination reveals a middle-aged white woman, apparently in some distress. The skin is rather pale and chalky, but free of rash, eruption or pigment. Examination of the head, eyes, ears, nose and throat shows no patho'ogical condition, except a moderate pallor of the mucous membranes. There is no fullness, adenopathy or rigidity of the neck. The chest is resonant on percussion, the breath sounds are normal, with no rales. The heart is not enlarged, rhythm is regular, rate 100, and no murmurs are audible. The blood pressure is 110/75. Examination reveals a slight enlargement of the lower abdomen, no visib'e peristalsis and no hernia visible on strain or cough. On palpation, there is well-marked rigidity and tenderness on pressure in the lower midline, reaching almost to the umbilicus. There is a mass palpable in the lower midline which cannot be definite'y outlined, due to abdominal rigidity, which apparently extends more to the right than to the left. The patient emphatically denies the possibility of pregnancy. On pelvic examination, the vaginal introitus was found to be small. There was no inflammatory change in Bartholin's or Skene's glands, no pus or tenderness from the urethra. The vaginal canal was filled with rather large clots and there was free bleeding from the cervix. On bimanual examination, the cervix was small and firm, and there is a hard round mass the size of a grape fruit filling the entire right side of the pelvis, located in the uterine wall with other smaller masses on the left. The spine, extremities and reflexes revealed no pathological findings.

Laboratory findings consisted of rather concentrated urine, specific gravity 1.040, with a slight trace of protein, no sugar and only an occasional pus cell. Hemoglobin, according to the Dare scale, was 64 per cent; red count 3,000,000; white count 17,300 with 80 per cent polymorphonuclear leukocytes. The Wassermann was negative. Sedimentation curve showed a rapid drop in the first twenty minutes and was flat from that time on.

Operation was advised, which the patient refused, believing that she cou'd be cured by medical treatment. The vaginal canal was packed and the patient treated symptomatically. The following day the packing was removed, which was soon followed by a recurrence of a profuse uterine bleeding, so profuse that it was thought wise to institute more radical means of controlling hemorrhage. The patient was matched with her brother-in-law and given 500 c. c. of who'e blood by the direct Unger transfusion method. Following this hemorrhage ceased and the patient consented to operation, which was scheduled for the following day.

Under ether anesthesia, a lower midline incision was made, the uterus exposed and found to contain an intramural myoma on the right side of the uterine wall, measuring from 16 to 18 cm. in diameter. There were several smaller nodu'es scattered about the fundus, varying from pinhead to green pea size. Clamps were placed along the broad ligaments and the fundus of the uterus amputated containing the growth. The appendix was exposed and found adherent; adhesions were freed and the appendix removed in the usual manner.

The postoperative diagnosis was degenerating fibromyoma of the uterus. The pathological diagnosis agreed.

The patient made an uneventful convalescence and was discharged from the hospital eighteen days after her admission. When she was last seen she had a hemog'obin reading of 90 per cent, menstrual cycle had been regular without pain, flow lasting from one and a half to two days. There has been slight discomfort in the region of the ovaries at the time of menstruation, otherwise, to use the patient's words, "she is in perfect health."

1028 W. Franklin Street

EXPERIMENTAL PRODUCTION OF GASTRIC ULCERS IN THE ALBINO RAT AS A RESULT OF VITAMIN G DEFICIENCY; ALSO AS A RESULT OF THE SPECIFIC INFLUENCE OF VITAMIN B DEFICIENCY*

PRELIMINARY REPORT

By BARNETT SURE, PH.D.,
and
HARVEY S. THATCHER, M.D.,
Little Rock, Arkansas

Gastric ulcers were reported by McGarrison[1] in 1921 as occasionally occurring in guinea pigs and monkeys on deficient diets, the former with a diet of crushed oats and autoclaved milk, and

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*From the Department of Agricultural Chemistry, University of Arkansas, Fayetteville, and the Department of Pathology, School of Medicine, University of Arkansas, Little Rock.

the latter on autoclaved rice. Sure, Thatcher and Walker,[2] in 1931, reported a gastric ulcer (acute) in the stomach of a weaned rat suffering from uncomplicated B deficiency. Another ulcer (acute) was discovered in a recut from some of this material after the article had been published. Ulcers of the stomach were also reported then in a few uncomplicated vitamin B deficient nurslings. Dalldorf and Kellogg,[3] in 1932, reported gastric ulcers in albino rats fed diets deficient in vitamin B. They found 73 per cent of a group with 74 observed lesions. Eight of these ulcers were chronic, indurated ulcers resembling peptic ulcers in man. In 1931, Thatcher, Sure and Walker[4] reported an ulcer (acute) in the rumen of a stomach of a rat suffering from vitamin G deficiency and a small abscess in the stomach of another rat with the same deficiency. Serial sections were not made at that time because of the extensive technical requirements, and because we were making a study of many other organs. Recently, serial sections were made of the stomachs of four rats of this series with one control and a small, chronic ulcer was found in the rumen in the lesser curvature in one stomach out of the four vitamin G deficient animals.

In the former work the dietary regime was not clear-cut for the differentiation between pathologic changes produced by the specific influence of vitamin B, and by undernutrition because of insufficient food intake.

In this investigation, the previously described dietary technic was employed which, briefly stated, consisted in restricting rats of the same sex, weighing 40 to 100 grams, to the same volume of water and amount of food consumed daily by their litter mates who received the diet deficient only in vitamin B or the vitamin B complex. The animals on the restricted diets were allowed in addition, vitamin B, either as dried baker's yeast incorporated in the ration, or a vitamin B concentrate (prepared by one of us, B. S.[5]) given separately from the diet. Since the plane of nutrition was controlled, the difference in growth and the accompanying pathologic changes produced must be attributed to the specific influence of the B vitamin or the B vitamins, depending on whether vitamin G was furnished in the ration. Thirteen such pairs of experiments were employed for the study of specific influence of the vitamin B complex and eleven pairs for the specific effect of vitamin B on histopathologic changes of various tissues.

After the completion of the experiments the tissues were fixed immediately in formalin. They were stained with hematoxylin and eosin. Practically all of the principal tissues of seventy animals were studied.

From the work of Dalldorf and Kellogg[3] it was not apparent whether the gastric ulcers were produced as a result of inanition or vitamin B deficiency, per se. Since our control rats were daily restricted to the same plane of nutrition as our pathologic animals, the complication of inanition has been circumvented in our investigation.

Besides the ulcers reported above, our experimental work with serial sections of stomachs included four complex and four B deficient animals with eight controls. The entire stomach was mounted so that the location of the lesions could be obtained. Sections averaged about 6 to 7 microns in thickness, but controls were about 15 to 20 microns thick. Every third section was mounted in stomachs of deficient animals and all of the sections of the controls were examined. They were stained with hematoxylin and eosin. About 16,000 sections were studied. The animals suffering from a deficiency of the B complex contained no ulcers in the stomach. One of them, however, contained a large cyst between the rumen and the glandular portion in the lesser curvature. Although only five lesions were found in eight rats, the majority occurred in the region of the stomach (the lesser curvature), where they are usually found in man. These microscopic lesions represent an acute and one chronic ulcer as they are present in the human. The rats included in our series with ulcers were those that were suffering from vitamin B deficiency and not from the deficiency of the two vitamins (B and G).

Serial sections of 4 cm. of duodena from ten rats were studied. These duodena included three from rats on a B deficient diet and three from rats on a B complex deficient diet. There were four duodena from control animals. Thousands of sections were examined microscopically and no duodenal ulcers were found.

Our results may be of interest to the gastroenterologist. In his cases of gastric ulcers, it would seem that diets of such patients should be particularly fortified with an abundance of vitamin B, but, since this is not always possible because of the restricted nature of such diets, it would appear that a concentrated vitamin B

extract[5] would be indicated in patients with gastric ulcer. This is, however, a problem for the clinician to solve.

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PEACE TIME ACTIVITIES OF THE MEDICAL DEPARTMENT OF THE UNITED STATES NAVY*

By P. S. ROSSITER, M.D.,†
Washington, District of Columbia

A large majority of even well informed persons throughout the country have little knowledge of the peace time activities of the Navy as a whole and less knowledge of the diversified activities of the Medical Department of the Navy. Many who give it any thought probably believe that in time of peace naval medical officers have very little to do and generally become pretty rusty professionally. This is far from true, for even in times of peace the relatively small medical personnel is very actively engaged, not only in sanitary problems, but in professional work comparable to that of a civil practitioner with a very active service. The standards of professional work among them compare favorably with that of any first class institution or group in the country.

The ships and stations of the Navy are officered and manned by a population equal to that of a city of moderate size. On October 30, 1933, there were 105,934 officers and enlisted men in the Navy, for whose health and medical and surgical care its Medical Department is responsible. In addition to these are our naval colonies of Guam and Samoa, where civil populations of 15,000 and 8,000, respectively, are directly administered by the Navy and complete medical care furnished by the Naval Medical Department.

Until recently, the Virgin Islands and its population of approximately 25,000 were also included in this category. In Haiti, the Dominican Republic and Nicaragua with a combined population approximating five millions, medical officers of the Navy have in whole or part organized and administered the Public Health Service and taken an important place in the field of preventive medicine in those countries. To deal with this task, the Medical Department of the Navy had on October 30 of this year 673 doctors, 184 dentists, 128 pharmacists, who form the commissioned or warrant branch of the personnel; 3,407 hospital corpsmen, who form the enlisted branch of the Medical Department, and 389 female nurses.

At the head of the Medical Department of the Navy is the Surgeon General, who is the Chief of the Bureau of Medicine and Surgery, appointed by the President, in accordance with the Revised Statutes, for a period of four years. The Bureau of Medicine and Surgery is one of five bureaus in the Navy Department established by the Act of August 31, 1842, which provides that the several bureaus shall retain the charge and custody of the books of records and accounts pertaining to their respective duties, such duties to be performed under the authority of the Secretary of the Navy, and their orders shall be considered as emanating from him and having full force and effect as such.

GENERAL DUTIES OF THE MEDICAL DEPARTMENT

In a general way, the duties of the Bureau of Medicine and Surgery and the Medical Department may be said to consist of safeguarding the health of the Navy. I propose to state, however, a little more in detail some of the duties prescribed by law and laid down in the United States Navy Regulations.

"The Bureau of Medicine and Surgery shall have charge of the upkeep and operation of all hospitals and of the force employed there; it shall advise with respect to all questions connected with hygiene and sanitation affecting the service and, to this end, shall have opportunity for necessary inspection; it shall provide for physical examinations; it shall pass upon the competency, from a professional standpoint, of all men in the Hospital Corps for enlistment, enrollment, and promotion by means of examinations conducted under its supervision or under forms prescribed by it; it shall recommend and have information as to the assignment and duties of all enlisted men of the Hospital Corps; it shall recommend to the Bureau of Navigation the complement of medical officers, dental officers, nurses, and hospital corpsmen for hospitals and hospital ships, and shall have power to appoint and remove all nurses in the Nurse Corps, subject to the approval of the Secretary of the Navy.

"It shall approve the design of hospital ships in so far as relates to their efficiency for the care of the sick and wounded.

"The Bureau of Medicine and Surgery is charged with the duty of inspecting the sanitary condition of

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†Surgeon General, United States Navy.

†Rear Admiral, United States Navy.

the Navy and making recommendations in reference thereto; of advising with the department and other bureaus in reference to the sanitary features of ships under construction and in commission, regarding berthing, ventilation, location of quarters for the care and treatment of the sick and injured; of the provisions for the care of wounded in battle; and, in the case of shore stations, of advising in regard to health conditions depending on location, the hygienic construction and care of public buildings, especially of barracks and other habitations, such as camps. It shall provide for the care of the sick and wounded, the physical examination of officers and enlisted men, with a view to the selection or retention of those only whose physical condition is such as to maintain or improve the military efficiency of the service if admitted or retained therein, the management and control of naval hospitals, and of the internal organization and administration of hospital ships, the instruction of the personnel of the Hospital Corps and Nurse Corps, and the furnishing of all medical and hospital supplies.

"All technical schools which are, or may be, established for the education of medical and dental officers or members of the Hospital Corps and Nurse Corps shall be under the supervision and control of the Bureau of Medicine and Surgery."

This constitutes a large order and one sufficient to keep the medical personnel actively employed. Such is, indeed, the case. The task is made the greater by the widespread distribution of the ships and stations of the Navy. On all ships and stations, however, there are excellent facilities for the care of the sick. At shore stations they are called dispensaries; on board ship, sick bays. Each consists of a drug room, an office and examining room, a small general ward, a contagious ward, an operating room, dental office, and a storeroom. Sometimes there is a quiet room and a small laboratory. The dispensaries and sick bays are intended for emergency treatment and the care of relatively transitory conditions.

The naval medical officer of a ship resembles in many ways a general practitioner in a small town with, however, certain differences. He has only men to deal with, they are carefully selected physically, and, with few exceptions, in the younger age groups. The diseases peculiar to such age groups are those commonly seen by him. The acute infections and communicable diseases, particularly the respiratory infections, are frequent, favored by the relatively crowded conditions of shipboard life and the difficulties of heating and ventilation. One feature of naval life not often mentioned but which probably has effect on the health of personnel is the rapid changes of climate to which they are often subject. Ships passing from the rigors of Northern winters to the tropics and back again in the space of a few days and without opportunity for acclimatization no doubt produce effects little studied or understood, but which may lead to certain pathological conditions.

In surgery, injuries as the result of the hazards of military and naval life and such conditions as acute appendicitis and hernia are common. Some one has said that the specialties of every general practitioner in civil life were obstetrics and internal medicine. The specialties of every naval surgeon are emergency surgery and preventive medicine. An acute appendix may occur when the ship is in the middle of the Pacific and tossing about in a rough sea. There is no way then to turn the case over to a surgical consultant. The medical officer of the ship must be the surgeon. But he must also be a sanitarian, for he is explicitly charged with the responsibility of reporting immediately to his commanding officer in writing upon "becoming aware of any contagious or infectious disease or its appearance among the crew," and "shall keep himself informed of the sanitary condition of the port in which the ship is lying, and immediately report to the commanding officer any facts that may influence the health of the personnel of the ship." It must be remembered, too, that the medical officer is charged with important military and administrative duties in addition to his professional work; that he is in charge of a department that includes the medical and dental officers, enlisted men of the hospital corps, that he inspects the food, makes inspection of "living spaces, holds and storerooms," attends all drills such as gun drills, man overboard, fire, collision, fire and rescue, and landing forces. On a large battleship with 1,500 officers and men for the population of the town in which he and one other doctor and a dentist share the general practice, he is sufficiently busy. Twenty thousand patients were treated in the sick bay of one such ship, 10,000 prescriptions dispensed, and 4,500 dental treatments given in a year.

THE NAVAL HOSPITALS AND THEIR WORK

For more complete medical and surgical treatment, the Navy maintains within the continental limits of the United States fourteen naval hospitals, while beyond the continental limits are three more. The most important naval hospitals within the continental limits are those at New York, Washington, D. C., Annapolis, Maryland, the seat of the United States Naval Academy, Portsmouth, Virginia, Mare Island, California, and San Diego, California. Beyond

the seas are the three important naval hospitals at Pearl Harbor, Territory of Hawaii, Guam, located on the island of that name far in the Pacific, and Canacao, located near Manila in the Philippine Islands.

In addition, the Navy maintains at present one, and until recently, two hospital ships, which are essentially floating hospitals, capable of accompanying the fleet or major groups of the fleet to any part of the world.

In the various hospitals there are about 3,000 to 6,000 patients being cared for daily. Every pathological condition is seen and definitive treatment is given, and these hospitals are as completely equipped with facilities for such treatment as are the large civilian hospitals of the country. The number of surgical operations performed in a recent calendar year was 28,117, excluding instrumental examinations, such as cystoscopy, bronchoscopy and similar procedures which added 2,980 to the number. It must be remembered that the location and the facilities of these hospitals also are intended to serve the Navy in time of war as well as in time of peace, and their size and location depends more on this special fact than on any other.

The most important single group of diseases in the Navy as respects number of original admissions is the communicable disease group transmitted by oral and nasal discharges. This group furnishes nearly 30 per cent of all original admissions to the sick list. Next to this are the venereal diseases. Third place, as a cause of morbidity, is occupied by wounds and injuries, including many special hazards peculiar to military and naval life. Diseases transmitted by insects and arthropods and representing many important tropical diseases, such as malaria, dengue, and pappataci fever, cause only about 2.5 per cent of all admissions for disease.

Smallpox, because of the care in respect to vaccination, is kept at the edge of non-existence in the Navy, notwithstanding the fact that on some foreign stations, as in Chinese waters, exposure to particularly virulent forms of the disease greatly increases the danger of infection. The Navy represents one of the most highly vaccinated groups in the world and the results with Jenner's discovery continue to indicate its tremendous value. Improved methods of packing to retain the potency of virus while in transit to distant parts of the world and through many climates are needed.

Wounds and injuries provide about 12 per cent of all original admissions to the sick list. During the past calendar year, the total number for the Navy was 6,588. Many of these are caused by special nautical hazards, such as operation of aircraft, submarines, handling boats, guns, ammunition, falls from masts, through hatches, falling overboard and similar accidents. However, though for many years drowning had been the principal cause of death, in recent years that place has been taken by automobile fatalities occurring among men while on leave and liberty. Last year drowning, the form of accidental death usually associated with seagoing life, caused 34 deaths, while automobile fatalities numbered 70. Nearly all were among men on leave and liberty. A few were among drivers of government owned vehicles at Navy Yards or other naval stations ashore.

RECRUITING ACTIVITIES

In an average year, medical officers of the Navy at our recruiting stations examine about 75,000 applicants for original enlistment, of whom more than two-thirds are rejected as physically unfit. The principal causes of rejection are defective teeth, errors of refraction, flat foot, defective physical development, underweight, color blindness, and diseases of the heart.

WORK OF DENTAL DEPARTMENTS

During the calendar year 1932, Navy dental officers treated 446,553 cases covering all types of dental operations and treatments.

MEDICAL SUPPLIES

To purchase and supply for use in the Medical Department drugs, instruments, hospital appliances, and to maintain stores of these articles for emergency use, three Naval Medical Supply Depots, one at Brooklyn, New York, one at Mare Island, California, and one at Canacao in the Philippine Islands, are maintained.

ACTIVITIES OF THE MEDICAL DEPARTMENT IN OUR COLONIAL POSSESSIONS

The Spanish-American War, which resulted in our becoming a world power with many widely scattered colonial possessions, added many duties to the Medical Corps of the Navy which they are still performing. These colonies contain large native populations and it became the responsibility of the United States to see that these people did not suffer from their change of status. Naval medical officers were faced with the problem of dealing with numerous tropical diseases, their prevention and treatment, and the prevention of their introduction

into the United States. Large civil populations became wholly or partly dependent for medical treatment upon the Medical Department of the Navy.

GUAM

This was particularly true of Guam, an island situated in the Pacific Ocean, 1,200 miles east of the Philippines. It was captured by the U. S. S. Charleston, then proceeding to Manila to reinforce the fleet of Admiral Dewey. On August 7, 1899, the U. S. S. Yosemite arrived in Guam and established a naval station there. Since that time, it has had a naval governor and all the medical work in the islands has been done by naval medical officers, a hospital was built, sewers were laid and arrangements made for obtaining an abundant supply of pure water. The island had long been devastated by yaws and a form of this disease, gangosa, in which the destruction of the palate gave a peculiar muffled character of the voice. Studies by early medical officers indicated that both yaws and gangosa were due to infection with a treponema, and responded to antiluetic treatment. Prior to this the ravages of these diseases had mutilated thousands. How completely they had been conquered is shown by a report in 1916:

"Guam has several hundreds of persons who show the residual effects of old gangosa lesions, but the treatment by salvarsan and mercury has been so successful that active cases are now very rare and a medical officer may serve a tour of duty here without ever seeing the disease in its acute manifestation."

With the building of a hospital and the institution of many important preventive measures was associated the founding of a training school for native nurses and the training of a large number of native young women in nursing. With these, too, were developed an extensive obstetrical service resulting in a marked reduction in maternal and infant mortality. The establishment of modern measures for the prevention of disease, the conquest of yaws and gangosa, the medical care of the civil and military populations have furnished and continue to furnish a field for active employment. It must be remembered that in this island the entire care of the population is placed upon the Medical Department of the Navy, and that the island is isolated far out in the Pacific.

AMERICAN SAMOA

American Samoa consists of a small group of islands in the Southern Pacific, which since its acquisition by the United States in 1900 has also been governed by a naval governor and its many problems dealt with by the Medical Department of the Navy. Within one year after occupation of Samoa, the entire population had been vaccinated against smallpox. The problem of water supply was less important than in some other places. In the first place, there was no trouble in getting water, for the average rainfall is 65 inches, and instances where it has risen to 300 inches in a year. One medical officer informs me that he saw 36 inches of rain in 48 hours.

The diseases most characteristic of these South Sea Islands are filariasis, yaws, hookworm infections, and elephantiasis. Hundreds of Samoans were crippled by the latter condition, due to the immense size of the edematous swelling, particularly of the scrotum. When sitting, the enormously enlarged scrotum rested on the ground and locomotion was impossible. In 1906, Fauntleroy devised a successful surgical treatment, which was modified by subsequent operations. This seemingly formidable plastic operation is performed with complete success and scrotal masses weighing from 10 to 85 pounds are removed.

THE VIRGIN ISLANDS

In 1917, the United States acquired the Danish West Indies, or Virgin Islands, by purchase. These possessions also, until recently, have been under the supervision of a naval governor. Sanitary conditions in these islands, of course, were considerably better than in Guam and Samoa, as the Danish Government had paid great attention to the welfare of this colony. However, both pellagra and typhoid fever were prevalent, and an active campaign resulted in a remarkable improvement in conditions and in a great diminution in the occurrence of both diseases. Although the islands were able to supply an abundance of food, such as eggs, chickens, milk and fish, it was found that, partly from poverty and partly from disinclination, the natives lived largely on corn meal and sugar syrups, with a little salt fish. The virtual eradication of pellagra was obtained by hospitalizing any patient discovered with it and treatment by the addition of the proper foods to the diet. Each cured patient became an emissary who spread the news, and resulted in a solution of the pellagra problem in the island. For fourteen years the Medical Department of the Navy was responsible for the sanitary and medical care of the entire population in these islands.

HAITI, SAN DOMINGO, NICARAGUA, AND THE PHILIPPINES

The work of the Medical Department in Haiti, San Domingo, Nicaragua, and the Philippines is also extensive. In the first three named a complete extensive public health service made up of medical officers of the Navy, assisted by native medical personnel, has been the starting point for public health activities which have contributed far-reaching benefits to the peoples of these countries and to science. For example, I will cite a few figures to show the extent of this work in Haiti alone. The total number of treatments in dispensaries and rural clinics in Haiti during a recent year was 866,673. The total number of injections for treponematosis, 550,945. Treatments for malaria numbered 36,853 and for intestinal parasites, 46,024. The total number of miles traversed in rural clinic work by automobile 73,770, by horse 11,610, motor boat 4,992, and by aeroplane 1,000 miles. Four and one-half million units of tetanus antitoxin were given, 24,000 points of cowpox vaccine used, and 1,050 doses of antirabic vaccine given. It is not surprising that with this wealth of material available, naval medical officers have made many important contributions to tropical medicine. At the recently founded Gorgas Memorial Laboratory in Panama the Navy has a medical officer engaged entirely in research in tropical medicine and hygiene.

RECORDS FOR PENSION CLAIMS AND STATISTICAL INFORMATION AND VETERANS' BUREAU PATIENTS

Although it is not usually thought of in connection with medical work in the Navy, a tremendous volume of valuable records and statistics regarding the sick and injured are made annually and published or filed. These records are of the greatest importance and many of them go back to the early days of our Republic. The physical and clinical records supply the authoritative information upon which all pension claims are based. This is of particular importance because from 1919 until almost the present time a vast number of veterans of the World War were cared for in naval hospitals. For example, in the three years 1929, 1930, and 1931, more than 100,000 cases coming under the Veterans' Bureau were treated in naval hospitals. The published statistics of disease are eagerly sought by health departments and actuaries throughout the world.

POSTGRADUATE TRAINING AND RESEARCH

The Naval Medical School in Washington is maintained as a postgraduate school for training in naval medical subjects particularly, and serves also as a consulting clinical laboratory for the entire Navy. It is a research center for naval medical subjects in such important fields as purification of air in submarines, the medical aspects of devices for escape from a submerged submarine, deep-sea diving, chemical warfare, and such aviation problems as a prevention of carbon monoxide poisoning among aviators, a work in which the Naval Medical Department has been a pioneer. High altitude flying, the maintenance of equilibrium and psychological problems connected with aviation are other important fields of study. There is need for research in the ventilation, lighting, and heating of ships, the prevention of communicable diseases afloat, the control of venereal diseases, and of clothing most suitable for the various activities of the Navy in the varying climates in which they are called upon to perform duty. These and many other diversified problems of naval medicine form an important part of the work of the Naval Medical School, and in the event of a national emergency its function as a training field in these subjects would be of the utmost value.

Each year, a Postgraduate Board makes studies of the specialist needs of the Navy and from time to time recommends to the Surgeon General the training of a certain number of medical officers at civilian institutions in the various specialties which they desire to enter. A small number of medical officers and enlisted men are given additional training at the Medical Field Service School maintained by the Army at Carlisle Barracks, Pennsylvania, so that they may be better fitted for duty with marine expeditionary forces. These expeditionary forces may be called upon at any time and with scarcely any warning for the protection of American and other lives and property in cases of disorders occurring in foreign countries. Supplying medical service to these marine expeditions and also to naval landing parties requires both higher specialized knowledge and specialized equipment. Personnel trained for this service must be immediately available at all times.

PREPARATION FOR NATIONAL EMERGENCY

It must not be forgotten that one of the Navy's most important tasks in time of peace is to be prepared for war, and that the Navy is intended as a barrier against enemies and, fur-

thermore, that it is the first barrier or, as a popular phrase has it "the first line of national defense." Its readiness must be limited to days and hours, trained personnel, facilities for care of sick and injured, and plans for expansion must carefully and laboriously be made ready during times of peace for periods of national emergency which may arise. However, it is not only for war that the Navy must be prepared. Other great emergencies calling for its services frequently arise. In time of peace, the Navy often meets emergencies which, in themselves, have many of the characteristics of war. At the earthquake and fire in San Francisco and at Messina, Italy, ships of our Navy at once sent landing forces ashore, accompanied by almost the entire medical department of the vessels present and rendered valuable assistance. At the earthquake in Japan, which demolished Yokohama, probably the most tremendous disaster of its kind in recorded history, vessels of the United States Navy were quick to speed to the relief of the stricken city. Food, blankets and medical supplies were landed, thousands of doses of antitetanic serum and typhoid vaccine were given, smallpox vaccinations carried out, as well as many other important sanitary measures, such as restoration of proper water supply, disposition of wastes, and similar activities.

In British Honduras and San Domingo City widespread destruction was caused by a hurricane, and here again naval medical officers gave assistance of the greatest value. Two years ago, the City of Managua in Nicaragua was almost destroyed by earthquake. The Naval Hospital Ship Relief, while proceeding north from Panama, at once turned back and proceeded to the nearest Nicaraguan port at full speed, landing medical officers, female nurses and hospital corpsmen, medical supplies and equipment. Last spring, an earthquake severely affected Long Beach and adjoining towns in southern California. Fire and rescue parties from the fleet with medical units attached were ashore in less than thirty minutes. So, even in peace time, the Medical Department of the Navy not only has to be ready for war, but to meet emergencies which are, in themselves, of the nature of war.

THE PRESIDENT AND THE NAVY

It is gratifying that President Roosevelt, the second of that name to have served as President and Commander-in-Chief and the second to have served as Assistant Secretary of the Navy, has in consequence so great a knowledge and appreciation of the importance of the Navy. He recently expressed it in his message last Navy Day. I quote in part:

> "The United States Navy has never failed to render the fullest measure of service to the United States in every war. The men and the ships of the Navy, constituting the first line of defense, have thwarted the hopes and ambitions of the enemy and in time of peace the Navy has ever been a true emissary of good will."

THE SECRETARY OF THE NAVY AND THE MEDICAL DEPARTMENT

We are today particularly fortunate, too, in having as Secretary of the Navy one who is very familiar to you here, for he is a fellow Virginian, Secretary Swanson, long a distinguished Senator from this State and for many years a member of the Naval Affairs Committee; his knowledge of the needs of the Navy and of the Medical Department of the Navy is pre-eminent. We look with confidence to his maintaining those needs at the highest possible point.

In conclusion, I wish to leave you with a broad, general picture of the Navy as a whole: more than 100,000 officers and men, a city in itself, but with its inhabitants scattered over the wide world in the performance of their duties, serving on ships in every sea and on stations in lands beyond the seas. The Medical Department of the Navy is engaged and busily employed with the tasks of caring for the sick and injured of the Navy afloat and ashore and occupied, too, with important problems of preventive medicine and the preservation of the health not only of the Navy itself, but of considerable native populations in colonial possessions or friendly neighboring countries. Besides doing these everyday tasks, naval medical officers have contributed much and are still contributing to research in the fields of preventive medicine, tropical medicine and naval medicine. Such are the peace time problems of the Medical Department and its peace time work. This work is often arduous, laborious sometimes to a degree, often done among the hazards of seafaring and military life, but our officers and men are rewarded in some measure by the satisfaction that comes from worthy accomplishments, and the feeling that the country realizes and appreciates their work, at once world-wide and humanitarian in character, spreading everywhere the best traditions of America and of American medicine.

SYMPOSIUM ON MALARIA—Part 3‡

MEDICAL RESEARCH, 1932-1933*

REPORT OF THE SUB-COMMITTEE

By HERBERT C. CLARK, M.D.,†
Panama, Republic of Panama

It is quite impossible for me to gain access to or to read all of the world's literature on this subject during the past year. Furthermore, it is out of the question for me to include in a fifteen minute report an abstract of all the literature that I have been able to see. The personal factor also leads one to select for abstract those features that have held his particular attention. I, therefore, request the indulgence of those writers whose work may not be mentioned in this brief summary.

It is of interest to note that Green[1] has been able to infect *Anopheles maculatus* Theob. and *Anopheles kochi* Don with the malarial parasite of the monkey *Macacus cynomolgus*. Sporozoites were found in *A. maculatus* and *A. kochi*, but oocysts only were found in *A. vagus*. In appearance and rate of growth the oocysts were indistinguishable from those of *P. vivax*. The sporozoites were plentiful in the salivary glands by the sixteenth day and they could not be distinguished from those of the human malaria parasites. This is offered as a warning to those who find Anopheles naturally infected.

Taliaferro's[2] experimental studies on the malaria of Panama monkeys leads him to suggest the probability that relapses are due to the temporary cessation of macrophage activity. Those interested in the treatment of malaria will of course be interested in learning what features may cause a cessation or stimulation of this activity.

Davis and Philip[3] have made a preliminary report on the identification of the blood-meal in the West African mosquitoes by means of the precipitin test. In view of Greens' warning that he could not differentiate the sporozoites of the monkey malaria from those of *P. vivax*, this blood-meal test may assume added significance for those who dissect mosquitoes caught in the wild state.

Wolter[4] has added a note on the use of the dark ground illumination for rapid diagnosis of malaria, using either fresh preparations or vitally stained blood films. This can be of diagnostic use in the laboratory and hospital, but will hardly be available for mass work in the field. Denes[5] also records a diagnostic hint for the laboratory and hospital services where large blood specimens are taken for general examination. He employs the usual 5 to 10 c. c. venous blood specimen after the serum and clot have been removed. The red cell sediment that remains provides good material for blood-film examination in searching for the parasites of malaria. Mayne and Griffiths[6] report *Anopheles atropos* D and K as a new potential carrier of malaria organisms. *A. strodei, A. buchmanni* and *A. albitarsis* in Panama are open to the same consideration. New subjects for study continually appear to confront those in charge of mosquito control campaigns.

Hackett and Missiroli,[7] in discussing housing as a factor in malaria control, attempt to dispel the myth concerning "malaria houses" or quarters that are said to possess attractive features for ideal anopheline shelter and feeding. We have noticed that certain families are particularly prone to be carriers of malaria, but this condition holds true regardless of their change of quarters and regardless of the change from the river bank to near-by hilltops. The family incidence in the villages we have under observation is a question that is hard to explain.

Martini[8] reports two interesting cases, one of long incubation period and one of a long delayed relapse. An assistant of the author was bitten by *A. maculipennis* which were infected with *P. vivax* on June 1, 1927. She remained well until May 29, 1928, when she had a rigor with high fever. There had been no possibility of infection with malaria in the interval. Her blood showed parasites (*P. vivax*) with many gametocytes. She was treated with plasmochin and recovered rapidly. Martini himself was bitten on July 21, 23 and 27, 1930. He felt ill on August 4-5 and 6-7, but his blood films were negative for parasites. He took quinine from August 9 to 18. There was nothing noteworthy until June 12, 1931, when he had an attack or

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†Director, Gorgas Memorial Laboratory.

‡EDITOR'S NOTE.—The Symposium on Malaria, papers and discussions from the National Malaria Committee, meeting conjointly with the Southern Medical Association at Richmond, Virginia, November 14-17, 1933, which are to be published in the SOUTHERN MEDICAL JOURNAL, is appearing in three parts: Part 1 in May, Part 2 in June, and Part 3 in this issue.

relapse. He considers that relapses are considerably influenced by meteorological conditions. Such cases are discouraging to the personnel of a health office whose business it is to attempt to locate the place where the infection was acquired. They seek a history of movements antedating the onset of symptoms by two or three weeks. No doubt the bulk of the cases do fall within this period of incubation.

Milani and Cuboni[9] inoculated 145 patients with strains of *P. vivax* and three of them (2.06 per cent) resisted infection, although they had never had malaria. S. P. James[10] inoculated 134 patients with no history of malaria and 14 (10.44 per cent) recovered spontaneously before the occurrence of the twelfth paroxysm. Some people, at least, for long periods of time, seem to possess a natural resistance to malaria and others acquire a respectable degree of acquired immunity, while still others may carry parasites over very long periods of time with little or no apparent symptoms. Bourguignon,[11] from the Belgian Congo, reports a parasite index in children under eighteen as 82.6 per cent and in adults as 56.5 per cent. He calculated the natural rate of spontaneous recovery, without drugs, at 31.6 per cent.

Thomson,[12] in writing on the question of immunity in man to protozoal diseases, states that some individuals may be completely refractory to an infection, but the most common type of immunity seems to be tolerance associated with the presence of parasites in small numbers. True immunity must be extremely rare, but it is easy to accept the term infection immunity.

It is my belief that with a normal placenta a child is born free of malaria. It may acquire it soon after birth, but usually it reaches the age of a few months before it acquires the disease. I used to feel that these early months without malaria indicated a degree of inherited immunity, but after seeing the way these babies are bundled up the first few months of their lives, I am not sure that it may not be explained as protection by clothing against biting. At any rate, most of these children soon acquire the disease and pass many years of their lives as malaria carriers or suffer repeated attacks. Infection immunity means more to me than inherited immunity. If there is such a thing as inherited immunity it is of short duration, even though the mother's placenta may have been heavily infested with parasites during the late stage of her pregnancy.

Manalang[13] reports a study of malarial infection in a construction camp in the Philippines that showed that transmission occurred four times more frequently on dark nights than when the moon was bright, and 87 per cent of the infected mosquitoes were caught when there was no moon or when it was obscured by clouds. The observations I find recorded concerning *A. albimanus* in Panama seem to indicate early evening and daybreak flights without regard to a dark night as an important factor. Manalang also noted that *A. funestus* had a flight range of more than a mile. Because of this long flight he remarks that Paris green would therefore be inefficient as a control measure.

Barber and Olinger[14] report that *A. costalis* will disperse at least half a mile from a large breeding place and probably much farther. Because of its adaptation to a great variety of breeding places, its rapid development in temporary water, and long flight, they express the doubt that any larvicidal campaign can by itself cope with conditions found in West Africa.

Curry's[15] report before this meeting has made known to you his belief that *A. albimanus* can make interrupted flights of 12 or more miles from certain new breeding areas in Gatun Lake of the Panama Canal Zone.

It is becoming more and more apparent as time advances that mosquito control campaigns must enlarge their radius of operation. The cost of such sustained work confronts everyone with the economy phase of the question and emphasizes the importance of two other features: first, the mosquito proofing of quarters and the proper use of such quarters; second, the use of drugs in reducing the human seed-bed of the disease. Different localities will find it necessary to give more emphasis to one method of control than another, but some coordination of mosquito control, mosquito proofing of quarters properly used, and treatment of the carriers as well as the hospital and dispensary cases must be gained to keep a check on the disease. No one method can be applied with complete satisfaction from the standpoint of complete control and economic efficiency.

There is, fortunately, a growing interest in the manufacture and use of new drugs for malaria and there will no doubt be more and more satisfactory developments in such drugs, but one cannot help stating that many of the reports made on the new drugs, as well as on quinine, are over-enthusiastic and in some cases unjustified. We have a very high regard for quinine as a treatment for an attack of malaria and feel

that it provides a fine weapon, the cheapest of the series of drugs now in use, but the question of relapse following vigorous treatment is a far more vital question than most of us realize or will admit.

Komp's[16] report read before this meeting on the use of atabrine in the Chagres River villages will show what happens under the best of personal attention. The short course of this drug makes it popular, but the rate of relapse is still an important feature and we do not yet know how frequently such courses can be repeated or need to be repeated. Nevertheless, the cost of such a drug as compared to quinine rules it out for the treatment of ambulatory cases and carriers in very large labor forces and in large rural populations.

The cost of 5 days' treatment with plasmochin and atabrine would provide more than 30 days' treatment with quinine and there is no satisfactory difference in the incidence of relapse between the two treatments nor sufficient evidence to lead one to believe that the index of mosquito infection has been changed enough to warrant the purchase of these drugs to replace quinine in large business enterprises.

It has been our experience, confirmed this year by Komp's work, that certain individual carriers are positive for parasites in all or nearly all monthly surveys regardless of whether they receive personal treatment. These, I believe, are people that should be hospitalized and treated in bed as if they were really sick patients and then held in isolation for a series of two or three months' study where a new infection can be safely ruled out of the discussion.

One gathers from reading the literature and listening to discussions on malaria control as well as observing the behavior of people in a malarious region that the following conditions exist:

Studies and expenditures in mosquito control, with the exception of permanent obliteration of breeding areas, are out of proportion to the stimulation of the proper use of mosquito proofed quarters and to the treatment of the ambulatory human seed-bed of malaria. The great majority of the people in rural locations who harbor malaria never appear for advice and treatment at a hospital, dispensary or private office.

A campaign launched in any region should coordinate these three features carefully if it is to be made of practical use to large business organizations in the tropics.

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BREEDING OF ANOPHELINE MOSQUITOES AMONG AQUATIC VEGETATION OF GATUN LAKE, ACCOMPANIED BY PERIODIC LONG FLIGHTS OF *A. ALBIMANUS* WIED.*

By DALFERES P. CURRY, M.D.,†
Balboa Heights, Canal Zone

It was believed by early workers in mosquito control that the flight-range of all *Anopheles* mosquitoes was extremely limited, nearly as limited indeed as that of the house-breeding yellow fever mosquito, *Aedes aegypti*, or of the night-biting domestic pest, *Culex fatigans*. Evidence is accumulating, however, which indicates quite the contrary; that at certain places and times, and

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†Health Department, The Panama Canal, and the Gorgas Memorial Laboratory, Panama.

under certain conditions, certain species of *Anopheles* fly over relatively enormous distances.

For many years the field workers of the division of sanitation of the health department of the Panama Canal have noted flights of *Anopheles albimanus* Wied., our most effective carrier of malaria, which must have come over distances which once would have been considered preposterous to suggest as possible. One should, of course, be extremely careful in drawing conclusions as to the source of any particular mosquito or flight, but I believe that our many years of observation in this field justify our conclusions regarding these flights.

The Isthmian year is divided into two major seasons, the dry season of approximately four months' duration, January to April, inclusive, and the wet season of the remaining eight months. The dry season is characterized by strong, persistent north winds, the trade winds, and much sunshine. Deciduous trees shed their leaves, the grasses die, and the ground becomes baked and fissured. An occasional shower may occur, but flood conditions do not result, for the baked earth absorbs the rainfall quickly. As the dry season draws to a close, and the wet season is about to begin, there is an intermediate period of some days, or even of a few weeks, during which the winds subside, the air grows more oppressively humid, the sky is overcast with clouds, and the temperature rises a few degrees, certainly the most uncomfortable season of the Isthmian year. There may be an occasional shower, but still the parched earth greedily drinks it in and no pools of standing water are created. Later, as the real wet season begins, there are copious, almost daily showers, but even these fail to establish permanent pools in sunlit areas, such as are preferred by the *albimanus* species of *Anopheles,* until the ground has become thoroughly saturated, usually a matter of several weeks more.

It is during these warm, humid, almost windless days of the intermediate period, before the real wet season begins, that the flights of *A. albimanus* occur. Practically simultaneously over the whole Canal Zone they are noted. Throughout the year the sanitary inspectors make weekly night catches of mosquitoes (6:00 to 8:30 p. m.) within the sanitated areas. During the height of the dry season the catch falls to practically nothing and the number of catchers and stations is reduced, but with the approach of the wet season they are again increased so as to note the first appearance of the flights. During the time of their maximum activity even daily early-morning catches are made at selected stations. For the fifteen years that the writer has been associated with the work these catches have been made fairly systematically, and every year it has been noted that the onset of the rains has been preceded by the appearance of flights of *A. albimanus* into the sanitated areas. Naturally, the constantly recurring question in the minds of all of us has been what is the origin of these flights?

Perhaps in no other jungle-covered, tropical country of equal extent is the terrain so thoroughly explored and known as it is in the Canal Zone and its vicinity. In the first place, the sanitary inspectors and their forces are men of long experience here, some of them having had more than twenty-five years of continuous service with the health department. Moreover, the Corps of Engineers of the Panama Canal Department of the U. S. Army has for years been making a painstaking survey of the entire region, and excellent topographic maps, lithographed in colors and on a large scale, are available for use by the health department. Airplane trips over doubtful areas are made by the sanitary inspectors in search for collections of water, and large scale photographs ("mosaics") are made for us by the Army Air Service. The "gold" (white American) supervisory personnel are men of rugged physique who take a keen delight and interest in the jungle life and in their work. Exploration of distant or isolated areas is looked upon as a delightful adventure rather than a task, and there is hardly a spot where water could exist that is not visited many times, be it ever so difficult of access. Thus it would seem impossible that there could exist, at the time the flights occur, an unknown breeding place of extent large enough to furnish the great numbers of mosquitoes that take part in them.

There is only one such breeding place known here, Gatun Lake, that great, artificial body of water 165 square miles in extent that was constructed as a part of the lock-system canal and completed and filled in 1913.

To the uninformed it usually appears that water alone is needful for the propagation of mosquito larvae, but that is as far from the truth as to believe that man can live on the bare earth alone, that the great deserts could support human life. Even as much as man, the mosquito larva requires food, certain conditions as to light, air and temperature, shelter from

enemies, and so on, and each species of mosquito makes demands that are more or less peculiar to itself. Thus the *albimanus* larva usually requires such conditions as exist only in fairly clean, quiet bodies of water exposed to the sunlight, rich in microscopic life as a food supply, and provided with a type of vegetation or floating debris that gives to the surface feeding larva protection from its predatory enemies, such as other insects and fish. It also shows a decided preference for human society and, under conditions apparently identical otherwise, it will breed in demonstrably far greater numbers in the vicinity of an inhabited house.

Gatun Lake did not at first present such favorable conditions. The flora and fauna natural to such a body of water were lacking, and developed only as nature adjusted herself to the tremendous change that had been imposed upon the region. In addition, and this is important, the entire Canal Zone was depopulated of all human inhabitants except Government employes, and these latter were concentrated mainly in a few towns and villages along the Panama Railroad. The lake itself, save for the channel for the passage of ships, at first presented a melancholy appearance of inundated jungle, a dreary expanse of dead and dying trees, shrubs and vines. As these were eaten down by termites, or rotted away to the water line, the aspect slowly changed and a new aquatic vegetation began to take possession; and even this latter is showing profound changes as time goes on.

From the beginning, the floating debris became lodging places for grasses and other aquatic plants; thus thousands of floating islands were formed, and still exist, slowly increasing in size. Two species of water-hyacinth (*Piaropus crassipes* and *P. azureus*) and a floating aroid, waterlettuce (*Pistia stratiotes*), took possession of every shallow inlet. The hyacinth became a serious inconvenience to navigation and the Canal has been obliged to spend enormous sums for its control by means of arsenic sprays. After flourishing for some years the waterlettuce, spontaneously and for some unknown reason, has almost disappeared from Isthmian waters, even in remote ponds where it was not exposed to the poison treatment used on the hyacinths. These plants and the floating islands are of importance because they, too, support a mosquito fauna peculiar to themselves.

The close association of *A. bachmanni* Petrocchi with *Pistia* is worth noting. Fortunately, there remains in one arm of the lake, the Paja River inlet, a fairly large number of the plants of *Pistia*. Among these plants *A. bachmanni* makes its larval creche, and they may usually be found there in large numbers to the exclusion of any other species. In other breeding places, such as are about to be described, *A. bachmanni* larvae are sometimes taken, one or two at most among hundreds of others, but such appearances of this species away from *Pistia* are exceedingly rare. It is of no importance here as a malaria carrier.

In recent years the health department has noted in the lake a great increase in two aquatic plants that promise to be of the utmost importance in the problem of malaria control. These are a species of bladderwort (*Utricularia mixta*) and several species of *Chara* (brittlewort or stonewort). These plants are usually entirely submersed, *Chara* being rooted in the bottom mud, and *Utricularia* floating unattached except when entangled with other vegetation. Both plants, under certain conditions, furnish apparently optimum conditions for the nurture of the species of *Anopheles* that require sunlit waters, especially of several of the white-hind-footed *Nyssorhynchus* group.

Chara first attracted attention in our lake waters in 1919, although it had probably existed in the region long before the construction of Gatun Lake. In 1922, notice was taken of it in the Annual Report of the health department and a photograph was reproduced in that report showing its appearance in the Rio Grande inlet of Miraflores Lake. It has now spread enormously in Gatun Lake, especially in the shallower inlets and along shelving banks. It may also exist to an unknown extent in some of the deeper waters, as Robinson (1906) states that it has been found growing in water up to 12 meters in depth. He states that there are 50 species known in North America, of which 17 occur in Mexico and Central America and 8 in the West Indies. The study of the Characeae and the determination of genera and species are most difficult. *Chara* is closely related to the algae and probably there are other related and somewhat similar plants here. Isthmian workers commonly refer to it as "moss."

The aquatic bladderwort (*Utricularia mixta*) is a flowering plant which has no real roots, but floats freely in the water unless accidentally anchored or entangled. In the flowering season it can be recognized by the tiny yellow flowers rising on slender stems a few inches above the

surface of the water. The leaves spread beneath the surface in large, graceful, feathery patterns. Attached to the slender leaflets are the small "bladders" (whence comes its name) which serve as traps for the little animal forms that swarm in the tropical waters. These traps are too small to entrap any but a very young mosquito larva, but the surface-feeding-and-floating habits of the larvae of *Anopheles* enable them to avoid contact with the submerged traps and thus remain uncaptured.

Many thousands of acres of lake are occupied by these two plants. *Chara* is in practically every shallow part, but bladderwort, probably because it is free-floating and is carried in the direction of the prevailing winds, is found growing extensively only in the southwestern part of Gatun Lake; it appears to be almost completely absent in apparently similar inlets in the northeastern part. Neither *Chara* nor bladderwort extend their needle-like foliage above the surface of the water, but stop just short of the surface. However, as the dry season advances, the lowered waters of the lake bring the tops of these plants (including entangled bladderwort) to the surface, and as the water falls an increasing amount of the lake surface is covered with sheets of the matted top leaves. The maximum permitted elevation of the lake is at 87.5 feet above sea level, which elevation is reached at the end of the wet season. By the end of the ensuing dry season the lake may have fallen more than six feet (below 81.5 feet), and at this latter stage literally hundreds or even thousands of acres of water surface are covered with scattered carpet-like mats of vegetation, below which the living plants still flourish.

As may be expected, these mats are rich in microscopic algal and animal life, and therefore are an ideal source of food for mosquito larvae. The wet, almost gelatinous, surfaces also furnish excellent protection from top-feeding minnows and predatory insects. Thus there are, increasing in size throughout the dry season, stupendous breeding areas in which are found larvae of *Anopheles* in incalculable numbers. Even the most experienced investigators are astounded at the great numbers of larvae at times found in these places and at their extent. The longer the dry season lasts the lower the lake level falls, the more and greater the patches of *Chara* and bladderwort that appear at the surface, and, consequently, the greater and more prolonged is the production of anopheline mosquitoes. This was especially marked this year when the lake equalled the lowest recorded level early in May and has since remained continuously at record low levels as compared with corresponding days of previous years.

An interesting phenomenon is that in the southwestern part of the lake, where bladderwort flourishes, *A. albitarsis* Lynch Arribálzaga is the dominant species, frequently outnumbering *albimanus* by more than four to one, and accompanied by a very occasional *A. bachmanni* or *A. strodei*. In other parts of the lake, where bladderwort is absent, only *A. albimanus* is found. One is deeply impressed when he sits in a dugout *cayuco* in the midst of an undulating surface patch of the matted tops of *Chara*, extending in an unbroken brown sheet as far as the eye can see, and, with a five by nine inch bread-loaf pan dips up more than a hundred *Anopheles* larvae of various stages and pupae at a single sweep over less than a square foot of surface. What must be the total daily emergence of mosquitoes over the whole lake at such times! If only one out of many thousands is able to reach the distant sanitated settlements this relatively small proportion is still large enough to account for the influx of adults that has been observed.

It is also interesting to note that apparently only *A. albimanus* undertakes this long journey. *A. albitarsis*, although breeding in enormously greater numbers throughout the southwestern part of the lake, is never taken on the wing or in houses or in the act of biting, even in the immediate vicinity of the most prolific breeding places. It seems to ignore man entirely as a source of blood. On the other hand, *A. albimanus*, as has already been stated, shows a marked preference for mankind, and even gives evidence of becoming somewhat domesticated, or at least of preferring to breed in the proximity of human habitations. Probably its need for sunlit waters and, therefore, for cleared land has developed this preference, which is now apparent here both on land and in large expanses of water.

It is these characteristics of *albimanus* that make the recent repopulation of the Canal Zone and the lake area by agricultural settlers (mostly negro West Indians) of the greatest importance in the problem of malaria control. It is probable the invasion of the Zone towns by *Anopheles* from the distant lake areas (twelve miles and more from the Pacific side towns) is not accomplished by one direct flight from the breeding places. It seems more logical to assume that it takes place by a series of

flights, perhaps in nightly stages, and that many of these mosquitoes have made their first, or even successive, stopping places at the cabin homes of settlers infected with malaria.

For certainly these *albimanus* are infected. Within a month's time following the beginning of the flights the Zone malaria rate has risen sharply. Simultaneously every part of the Isthmus suffers, Atlantic side as well as Pacific. Not that the rate is alarmingly high as compared with other tropical countries of similar climate, or with the earlier construction period of the Isthmus, but as compared with the present usual yearly rates the increase is marked.

As the wet season advances, the lake begins to rise once more and there is a gradual diminution in the amount of *Chara* and bladderwort exposed at the surface, although there is never a time when it is all submerged. Necessarily the amount of mosquito breeding decreases, too, as the favoring vegetation is submerged, and perhaps also the prolonged heavy rains destroy many adults and larvae. At any rate, the peak of the flights is soon passed, and thereafter, at the proper interval, the malaria rate also declines to its normal (but, of course, fluctuating) wet season rate.

The question of the control of these flights and the subsequent malaria incidence has for years given the health department grave concern. Frequent trips are made by launches to the various parts of the lake to determine the extent and the location of the breeding. Microscopes are taken along as a part of the equipment so that identifications may be made on the spot, and thousands of larvae are brought to the laboratory to breed out. But no easy solution of the problem as a whole has presented itself.

In the Stilson Pond inlet of Gatun Lake, from which the town of Gatun takes its water supply, the municipal engineer's forces wage unremitting warfare against the *Chara* by dragging it out into small boats and stranding it high on the banks. A number of men are engaged in this task almost the year round in order to obviate the necessity to use oil or other larvicides on the water supply. In the small group of lakes contributing to the Miraflores Locks the health department maintains a motor boat and several row-boats, in which latter are mounted oil tanks with hand pumps that cover the shore line and the patches of *Chara* twice monthly with a film of oil. The results here are excellent. But to attempt similar methods of control over the whole of Gatun Lake, with its 165 square miles of area and more than 1,000 miles of deeply indented shore line, would cost what is at present considered a prohibitive sum. Yet in the application of oil seems to lie the best solution of the problem should it ever become necessary to undertake the control of these areas.

Even airplane dusting with Paris green does not at this time seem feasible within permissible economic limits, nor would it be as effective on the whole as the oil spray. While there are in some places, notably in the Rio Gatun-Rio Agua Sucia inlet of the lake, continuous areas of *Chara* of enormous extent, yet for the most part the plants appear in much smaller patches scattered widely over the irregular shallow shore line of the lake. Oil is relatively very cheap in the Canal Zone; facilities for its transporation are excellent; it is effective against all the aquatic stages of the mosquito, both annoying and harmful; it is relatively long-lasting in its effectiveness, requiring fewer applications; the apparatus for the application of oil is inexpensive and simple to operate; oil can be applied with precision over small or discontinuous areas. The airplane's advantage here is limited to the control of *Anopheles* only, in large bogs or marshes of continuous area in which progress on foot or by boat is greatly impeded.

It does seem perfectly evident that the Zone government should continue and even, when conditions permit, extend its present policy regarding the removal from the Zone of the agricultural settlers, who are mostly otherwise unemployed negroes of very limited means, unable to build screened homes on their small holdings. To permit any increase in the number of such settlers is only to add fuel to the fire, and already steps have been taken to prevent the entrance of additional settlers and to reduce gradually the number of those already established. Unfortunately, even complete depopulation once more of the Zone agricultural areas will not entirely remove the sources of infection near the breeding places of the mosquitoes. In many places the boundary of the Republic of Panama, over which we have no control, approaches closely to the lake's edge. Outside the limit of five miles on either side of the Canal prism the Zone's jurisdiction extends only as far as the 100-foot contour about the lake, just 12½ feet above the high water level. Since the completion of the canal the strip of Panama territory about the lake's margin has become pretty heavily populated, the construction of the lake hav-

ing provided a ready means of communication with hitherto almost inaccessible regions.

It has been suggested that in some sort of bionomic control of the mosquito or of the plants a solution will be found. A certain species of *Chara* (*C. foetida*) has been said to be inimical to the development of mosquito larvae, but recent investigations indicate that it is of no practical benefit and that the Characeae in tropical and subtropical regions elsewhere favor the development of mosquitoes much as they do here.

One ray of hope does appear, however, for the future, perhaps. The new Madden Dam, now being erected across the upper Chagres River at Alhajuela, will impound in the gorges and valleys above it a huge lake whose chief purpose will be to supply water to the lower Gatun Lake in the dry season and to control floods during the wet season. When this dam is functioning there will be less fluctuation in the level of Gatun Lake and consequently, it is hoped, far less of the *Chara* and bladderwort will be exposed at the surface because of lowered waters late in the dry season. The new lake will have no similar trouble because the seasonal difference in levels in this lake will be more than 100 feet, a range that will not permit the development of the plants at the surface of the water.

The conditions herein described indicate clearly that the Canal Zone, contrary to widespread opinion, and despite the great effort and large sums spent upon it, has not achieved complete mastery of its malaria problem, but that the need for continued study and effort is as unremitting as ever. Furthermore, it is indicated that the excellent screening of the houses of the employes is not merely an expensive luxury, but that at times it is still a vital element in the protection of the health of the community. They also emphasize that, beyond the work of the Government in providing sanitation and screening, there still exists a need for the cooperation of individuals to protect themselves from malaria. The health department considers it advisable to warn the residents of even the most protected communities against needless exposure out of doors after nightfall during the period that the mosquitoes are most active. Unfortunately, the comparative security of the greater part of the year, and the fact that the malaria incidence follows only some weeks after the onset of the flights, tend to make the public generally indifferent to warnings that are issued each year through the local press and by means of circulars.

SUMMARY

Gatun Lake of the Panama Canal system has developed an aquatic flora of *Chara* and bladderwort that provides breeding places for great numbers of *Anopheles*. *A. albimanus* is more domestic and more anthropophilous, and breeds more profusely in the lake in exposed patches of *Chara*. *A. albitarsis* is not anthropophilous and prefers exposed *Utricularia* as a breeding place.

Sanitated areas of the Canal Zone are visited annually, before the onset of the rains of the wet seasons, by flights of Anopheles that have flown as much as twelve miles or more from distant lake areas. A sharp rise in the malaria rate occurs following the flight season. Both flight season and peak of malaria are of comparatively brief duration.

Because of the great size of Gatun Lake and the extent and number of breeding places during seasons of low water no economical method of control has been devised. It is believed that future control of Gatun Lake levels within smaller ranges of fluctuation, by means of a new storage lake now being created in the upper Chagres River valley, may, to some degree, lessen the appearance of vegetation at the surface of Gatun Lake and, consequently, the production of *Anopheles*.

The presence of agricultural settlers in the Canal Zone aggravates the situation by furnishing "seed-beds" of infection for the *Anopheles*. Further depopulation of the Zone agricultural area is recommended. The Canal Zone has not completely mastered its malaria problem, and screening of homes is still necessary.

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DISCUSSION (*Abstract*)

Dr. Herbert C. Clark, Panama, R. P.—The construction period of the Panama Canal and the period of operation and maintenance represent different phases in regard to exposures to malaria and the practice of anopheline control measures. During the construction period, the Canal Zone was practically uninhabited and the contact villages on the border were very few and small. The Canal Zone employes occupied a string of villages and labor camps along the line of the Panama Railroad. These were under a short radius control of mosquito breeding and the official quarters were all screened. During this period of time, there was very little opportunity for outdoor entertainment following the day's work. Practically all entertainment was con-

ducted inside the screened homes or the screened club houses. There were no large water surfaces such as the Miraflores and Gatun lakes now provide.

The period of operation and maintenance was accompanied by the formation of the two lakes mentioned and by the abandonment of many of the railroad towns and camps due to the reduction of the labor force and the concentration of the permanent personnel in the terminal cities and at the lock sites. Very soon, also, an Act was passed that threw open to settlers almost the entire limits of the Canal Zone. This led to the clearing of the major part of the Zone and its occupation by farmers who could not be included in the sanitated areas. At the same time settlements began to grow in number and size at many favorable points on the border of the Zone and lakes. The shore line of Miraflores Lake is short enough and close enough to two lock sites to fall within financial reason in the application of mosquito breeding control and it has been well protected. Gatun Lake is a different problem. It contains 165 square miles of surface and has a changing surface elevation that varies about six feet between flood season and dry season levels. This gives a shore line that varies with the seasons from about 1,000 to 1,200 miles. The new breeding areas are in the many large indentations formed about this shore line where certain aquatic plants thrive. The rural population in and near these shore lines is in constant business contact with the terminal cities and the population is increasing. The size and permanent character of this "human seed-bed" of malaria is of vital importance in the consideration of any new control measure. Monthly surveys show an annual average parasite index of about 25 per cent.

It seems to me that changes in the anopheline life and aquatic plant life are to be expected. The external surface and alimentary tracts of aquatic migratory bird life and such land animals with aquatic habits as the tapir can transplant seeds that may find a favorable foothold. The external surfaces of migratory birds might also bring in the mosquito egg mats that would thrive. One should also bear in mind introductions by ships making the transit of the Canal as well as the danger to the ships' crews and passengers from our late dry season anopheline flight. The latter risk seems comparatively small, since the personnel on Barro Colorado Island has not observed this flight nor suffered any attacks from malaria that originated on the island.

LePrince[1] suspected in 1913 that the lake shore would be a potential source of troub'e. He determined at that time that *A. albimanus* was capable of coming into Gatun from outside the sanitated areas and that they made flights of at least a mile under certain conditions. He noted that some flights were at elevations of 30 and 40 feet and that the important evening flight was at 6:30 to 7:00 p. m., while a return flight at 6:00 a. m. was also noted in which some of the mosquitoes contained b'ood. He and Bath[2] believed that the amount of body scent determined the flight direction of *A. albimanus*. It would seem from the return flights noted by LePrince and from the simultaneous Atlantic and Pacific flights mentioned by Dr. Curry's paper that they do not always fly with the air current. Is there a haphazard radial flight in all directions from such breeding grounds or is flight density determined by populated centers and squatter lines of settlements regardless of the direction of air currents?

Our increased rate of hospital and dispensary malaria cases cannot alone be due to these new lake breeding places. We now have good roads, airways and sailing services that take us out of the sanitated zones over the week-ends and holidays. These lead to many exposures that could not have occurred in the construction period of the Canal history. There are far more opportunities for entertainment outside screened quarters during anopheline flight hours than formerly existed. I think we are all agreed that these large lake breeding areas with the possibility of long range flight are of comparatively short duration near the end of the dry season. It presents, nevertheless, a serious problem in connection with the unprotected inhabitants that live in and near the Canal Zone. It is hoped that the Madden Dam Lake will solve this problem without, also, introducing some new hazard.

Circumstances indicate that *A. albitarsis, A. strodei* and *A. bachmanni* are not important vectors of malaria. It would be interesting, nevertheless, to conduct some biting experiments with these mosquitoes. *A. albimanus* seems capable of meeting any new conditions that have confronted it in this region and I shall not be greatly surprised if Dr. Curry and Mr. Komp are able to prove in observations conducted over a few more dry seasons that flights of twelve to fifteen miles are being made under special conditions by *A. albimanus*.

Dr. W. V. King, Orlando, Fla.—In temperate regions, large migrations of insects are brought about by seasonal changes in temperature, and with many species extensive dispersal regularly occurs in the fall and spring. Other factors such as winds, or scarcity of food, are also responsible for concerted movements of insects. In the case of salt marsh mosquitoes the long flights are probably stimulated primarily by the desire for blood, but it is also possible that the mere presence of great hordes of individuals in close proximity also acts to a certain extent as a flight stimulus. On first reading of the data presented by Dr. Curry it would appear that the flights of *Anopheles albimanus* from Gatun Lake were similar in origin to those of *Aedes sollicitans;* that is, simply a phenomenon of enormous production. I am, however, impressed by the author's statement that the flights occur only during the warm, humid days of the intermediate period between the dry and the wet season, and it seems likely, therefore, that the migrations actually correspond to a seasonal movement, with a change in humidity providing the impetus. Whether or not this is the correct interpretation should, I believe, be given further consideration, as it is a point of general entomological interest.

Regarding the distance of flight, the author appears to be somewhat diffident in stating the mileage covered, possibly from a fear of arousing our incredulity. The figure given is "twelve miles or more," but he also states that all parts of the Canal Zone are affected, and from a map of this area that I have consulted, the City of Panama appears to be at least 20 miles from the main part of Gatun Lake. Accepting the minimum figure of 12 miles, however, this undoubtedly constitutes a new flight record for an anopheline species. There are, in fact, very few recorded observations on flights of much more than a mile. Kligler and Mer in Palestine have reported the finding of *A. elutus* at a distance of 14 kilometers, or about eight and one-half miles, from the nearest breeding place, and *A. maculipennis* has been observed in California at distances up to four miles. These flights were regarded as pre-hibernation movements. I may also mention an

observation made by myself in New Orleans in 1915, when large numbers of *Anopheles crucians* came into the city shortly after the occurrence of a severe storm with widespread flooding of the distant marshes. From a familiarity with the surrounding territory I felt sure that the unusual numbers of mosquitoes had not been produced within at least five miles of the center of the city and the probabilities were that most of the individuals had come from much greater distances. The evidence is therefore accumulating that not all species of *Anopheles* are limited to a short flight range and I have little hesitancy in accepting Dr. Curry's conclusions in view of the fact that, with a species of insect which is inclined to haphazard dispersal, the amount of territory covered must bear some mathematical relation to the number produced. The production of *albimanus* in Gatun Lake under the conditions described is certainly sufficient to account for the extensive distribution. We shall await with interest the publication of more detailed records concerning the flights.

MALARIA CONTROL IN ALABAMA*

By J. N. Baker, M.D.,†
Montgomery, Alabama

Minor Drainage.—The major accomplishment along the line of malaria control in Alabama during 1933 has been an extensive minor drainage program made possible by the expenditure of funds for relief. The work was also made to embrace general mosquito control in and about towns and cities.

County governing bodies were given a voice in designating the work projects, inasmuch as the Federal funds were supplemented by local funds.

Among the many types of work relief projects malaria control drainage came in for hearty approval by the State Relief Administrator. County commissioners, however, were inclined to give road work first consideration. This came as a natural consequence, as organizations handling road and street maintenance were in best position to use men employed by the relief administration. Restrictions on the funds prevented their use in providing either tools, equipment, adequate supervision, transportation or engineering service. Notwithstanding these difficulties and those incident to working men in ditches, particularly during the winter, drainage projects were gotten under way in many counties. Many important foci were eliminated. The accomplishments resulted from a united and cooperative effort on the part of all concerned to improve health conditions and benefit the public generally.

The extent of the drainage work which is still in progress will be shown later in a summary report. For the immediate future there is contemplated an even more extensive program, as the Public Works Administration through the U. S. Public Health Service proposes to provide through the State essential engineering service, supervision and a limited amount of equipment in utilizing labor now on relief rolls.

Impounded Water.—With one exception malaria control on the major impounded water projects was entirely satisfactory. *Anopheles quadrimaculatus* production occurred on this project in spite of diligent oiling operations with the most modern equipment. The failure to produce an adequate control may be attributed to the maintenance of a constant water level made necessary by the construction of a lock at the headwaters of the lake. In order to establish the extent of malaria transmission around this project, a representative blood and history survey was made during September. Of the 206 people surveyed, 87, or 42 per cent, gave a positive history of malaria during the year, and 47, or 22.3 per cent, showed positive for malaria by blood examination.

The proposed construction of the General Joe Wheeler Dam on the Tennessee River at the headwaters of Lake Wilson will impound a lake affecting thousands of people in a number of counties. When the project was in the jurisdiction of the War Department a reconnaissance survey was made by an engineering officer in company with a representative of the State Health Department. A report was rendered covering the basic needs of the development. The project has now been transferred from the War Department to the Tennessee Valley Authority. A medical officer was appointed by the Authority and at a conference with him the matter of malaria control was brought officially to the attention of the T.V.A. The importance of its consideration in basic planning was pointed out.

Trend of Malaria.—Indications are that Alabama this year will experience an increase in malaria incidence over that which occurred last year, which, incidentally, was the lowest on record. No explanation of the evident increase can be made at this time.

The comparative morbidity reports for the State as a whole for the years 1929-1933 from

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†State Health Officer.

January 1 to November 1 of each year are given as follows:

Year	No. Cases Reported
1929	9496
1930	4397
1931	2219
1932	2004
1933	3897

MALARIA CONTROL IN ARKANSAS, 1933*

By W. B. Grayson, M.D.,†
Little Rock, Arkansas

Malaria control activities in Arkansas for 1933 showed a marked increase in minor drainage, particularly in rural areas, and a decided reduction in control measures in urban areas. Due to greatly curtailed budgets in our cities, the usual activities were greatly reduced, and in many cities completely abandoned.

In cooperation with the State and county relief commissions, many drainage projects were recommended for work relief and much excellent work was done. In most instances, the projects recommended for work relief consisted of clearing and cleaning of existing streams and ditches. Many existing drainage ditches and stream channels were found to be obstructed by silt and vegetation, and it was felt that the greatest good could be accomplished in restoring these channels. The projects recommended were surveyed and the benefits to be derived from the proposed work carefully appraised from a public health standpoint. Projects in close proximity to densely populated areas were selected as this seemed to be desirable from the standpoint of furnishing work relief, as well as affording the greatest amount of protection against mosquito infection. One difficulty experienced in connection with this program has been the lack of direct supervision over the work by men experienced in minor drainage from a malaria control standpoint.

The mosquito-proofing program begun in 1931 was practically abandoned in 1932, but should be restored as soon as economic conditions permit.

The total number of malaria deaths reported for 1932 was 482, or 41 per cent less than the four-year average from 1928 to 1932. The total number of malaria deaths reported to September 1, 1933, is 298.

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†State Health Officer.

REPORT OF MALARIA CONTROL ACTIVITIES AND OTHER STUDIES IN THE STATE OF FLORIDA DURING THE YEAR 1933*

By Henry Hanson, M.D.,†
Jacksonville, Florida

The research on malaria has continued as for the previous year with some enlargement of its scope. As was the case before in the Research Division under the direction of Dr. Mark F. Boyd, of the Rockefeller Foundation, the patient with general paresis at the State Hospital for Insane has served as the principal culture medium for the study of the malaria parasite. There have been valuable by-products in this study which are of importance from the therapeutic standpoint. Those interested in this work are referred to the literature on malaria, where a number of recent publications by Dr. Mark F. Boyd and Dr. W. K. Stratman-Thomas will serve as a progress report on the work of the Malaria Research Division.

In our Division of Malaria Control Studies a brief summary is submitted below:

"In the Division of Malaria Control Studies blood indexes were extended to include, during the year, rural schools in Taylor, Citrus, Flagler, Leon, Levy and Sumter Counties. A general blood index was taken in a section of Alachua County. An anopheline survey was made of Taylor County and anopheline index, or collecting stations (barns, stables, privies, etc.) were selected for future development on malaria control now being done in the County by drainage. Antimalaria drainage has been underway throughout the year in Leon County, employing relief labor, for the most part, and under direction of a specially trained engineer. In Citrus County a special study of the efficacy of atabrine and plasmochin has been conducted at the town of Homosassa under the direction of Dr. Griffitts. During the fall of 1932 and the early months of 1933 nearly 10,000 school children in rural sections of Florida have been examined (blood examination) for malaria and a rate has been observed of 3.0."

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†State Health Officer.

This is what might be regarded as a headline paragraph submitted by the Director of the Malaria Control Studies, Dr. T. H. D. Griffitts.

In our Bureau of Vital Statistics some work was done to ascertain the accuracy of the causes of deaths given on death certificates where malaria was shown and the following paragraph is quoted on this point:

"For your information in discussing our report, I might mention that out of forty-three questionnaires sent recently where the cause of death was given as "Malaria," fifteen were returned by the physicians designating estivo-autumnal; nineteen tertian; one quartan; seven unknown; and one an entire change of diagnosis. You can readily observe by this experiment that the education of the attending physician is broadened or his statements are made a great deal more definite through the process of the questionnaire. If this procedure is carried out in all of the states where deaths occur from malaria, it will certainly give us much more definite information as to the basic facts."

The activities of the Bureau of Sanitary Engineering are shown as follows:

"Malaria control activities of the Bureau of Engineering during 1933 consisted principally in surveys, inspections, and approval of drainage projects as pertains to mosquito control.

"On January 24, the Director of the Florida Emergency Relief Administration issued an order that no more projects which contemplated mosquito control measures would be given approval until they had first been examined and approved in writing by a representative of the State Board of Health. Prior to this date this Bureau had given approval to many projects throughout the State after a thorough examination had demonstrated their worthiness as regarded mosquito control.

"Since the inauguration of this program by the Director of Emergency Relief and the State Health Officer, 260 projects have been approved in 47 counties. Supervision of these drainage projects by the District Sanitary Officers is necessary to secure a reasonable compliance with correct practice as regards the manner of construction of proper drainage ditches.

"During the surveys and investigations in the malarious sections of the State, advantage has been taken of the opportunity to educate the home owners and tenants, also those in lumber mill quarters, concerning mosquito-proofing their homes, and the Bureau's publication relative to this matter has been widely distributed.

"The following are the counties in which drainage projects for mosquito control have been approved:

Alachua	Collier	Franklin
Baker	Columbia	Gadsden
Bay	Dade	Gulf
Bradford	Dixie	Hendry
Broward	Duval	Hillsborough
Clay	Escambia	Holmes
Citrus	Flagler	Jackson
Jefferson	Okaloosa	Sumter
Lake	Okeechobee	Suwannee
Levy	Orange	Taylor
Liberty	Osceola	Volusia
Madison	Palm Beach	Wakulla
Manatee	Pinellas	Walton
Marion	Polk	Washington
Martin	St. Johns	
Nassau	Santa Rosa	

"Regular periodic inspections have been made of the control measures for *Anopheles* breeding in the Ochlockonee on the Jackson Bluff project, covering the impounded area of the Florida Power Corporation. Weekly reports of daily observations are received from the Foreman in Charge, and include air temperature, water temperature, wave action, and number of larvae per dip. Information concerning dusting and the number of pounds used per acre is also given, for our records."

In addition to the above, we have had one man who has given practically his entire time to the planning of drainage work in Leon and Taylor Counties, an employe made available through the cooperation of the Rockefeller Foundation. Finally, considerable valuable data has been accumulated by Dr. W. V. King and his assistants in the Station of the Bureau of Entomology located at Orlando. Surveys have been made by the Bureau to determine the prevalence of *Anopheles* mosquitoes as well as those classified in the pestiferous group.

The latter part of the year has been somewhat disorganized insofar as systematic control is concerned because of many new projects for relief work.

MALARIA CONTROL IN GEORGIA, 1933*

By L. M. CLARKSON,†
Atlanta, Georgia

The year 1933 has been the third year of very intensive promotion of urban and rural malaria control, principally by the method of drainage.

The State Board of Health inaugurated drainage by the use of convicts during the year 1929. This work was promoted to the extent that by 1932 about forty-five counties had been using both State and county convicts for malaria drainage supervised by our Division of Sanitary Engineering.

During the past year this work has been greatly accelerated by the use of unemployed ob-

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†Chief, Division of Sanitary Engineering, Georgia State Board of Health.

tained from the Georgia Relief Administration for malaria drainage.

The plan which is now being inaugurated between the Federal Relief Administration and the U. S. Public Health Service does not initiate a new plan in our State. Ever since Reconstruction Finance Corporation funds became available, and later carried on by Federal Relief Administration, we have made extensive use of the unemployed through the cooperation of our Georgia Relief Administration for malaria drainage.

At the end of 1932 there had been drained 760 ponds, comprising approximately 14,000 acres, involving over 1,000 miles of ditches. This work during that year was confined to forty-one of our malarious counties.

We shall not know until the end of 1933 the extent of this work, but we can report that it has been so greatly accelerated that the amount of work that will be shown by our 1933 report will be almost inconceivable. Today in Georgia practically every county is using unemployed for mosquito and malaria control.

We continue to assume authority over our hydro-electric impounded waters. We issue permits for our hydro-electric lakes as well as lakes and ponds for fishing and recreational purposes. Many of these bodies of water in the particularly malarious section of the State apply twice monthly larvicides approved by the State Board of Health for prevention of mosquito production. Newly impounded areas must be effectively cleared of all vegetation before the water is impounded. The water areas must be kept free of floatage and growing vegetation. We have about 150,000 acres under annual larvicide control.

We have induced many cities in the State to permit delinquent tax payers to work out their taxes on malaria control. Also some cities have given employment to persons not on Federal Relief Administration rolls on malaria drainage.

We prepare annually spot maps showing both malaria morbidity and mortality and make full use of these maps in planning and selecting counties to apply our malaria control methods. We keep malaria control constantly before the public through distribution of literature and public talks. The people of our State make full use of the State Board of Health as a clearing house for malaria information and for assistance on malaria control.

In several of our malarious counties during the past year we secured blood smears from the school children in order more properly to determine the foci of infection and the type of infection. In one county this was followed by the use of atabrine and plasmochin. Very accurate results were kept of this experiment and it proved to be highly successful.

County health officers are rendered every assistance possible by both the Division of Epidemiology and the Division of Sanitary Engineering. With acceleration of drainage for malaria control we feel confident that by another year we will see extremely gratifying results in malaria reduction.

MALARIA CONTROL IN LOUISIANA IN 1933*

By J. A. O'HARA, M.D.,†
New Orleans, Louisiana

The malaria control program in Louisiana in 1933 was necessarily curtailed due to lack of funds. The increase in the number of cases of malaria for the past year is attributed to economic conditions. The number of dwellings screened during the year was 1,397, which is slightly lower than in 1932. There was a continuation of the usual activities; old ditches were sprayed and cleaned, new ditches dug, swamps drained and ponds oiled.

The outstanding incident in malaria control in Louisiana during the year 1933 was the work done by the State Board of Health in Livingston Parish in October and November. An unusual number of cases of malaria was reported in that section. Diagnosis of the majority of the cases showed a pernicious type of estivoautumnal malaria. The cause of the outbreak was attributed to swamps and stagnant pools, lack of rain and fresh water, which allowed the propagation of the *Anopheles* mosquito. It was found that many of those affected lived in homes without screens, and the majority had no mosquito bars. Many persons were undernourished. There were 155 positive cases in this section.

The following sanitary measures were put into effect:

(1) Homes and fields in the immediate

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†President, State Board of Health.

Springfield area were cleared of rubbish and weeds, and drainage ditches were dug.

(2) Screening and mosquito bars were installed.

(3) Swamps and stagnant pools were drained where possible and large undrainable areas were sprayed.

(4) Insecticides were furnished for the homes.

In addition, the State Board of Health—

(1) Employed two physicians and three nurses and an assistant pharmacist to take charge of affairs from October 29 through November 17, 1933;

(2) Supplied drugs for a temporary hospital and the community;

(3) Furnished screens, mosquito bars and insecticides;

(4) Assigned an engineering corps to supervise drainage projects and spraying; and

(5) Detailed ambulances for transporting patients.

At the same time there was splendid cooperation by the Citizens' Conservation Corps, the E.R.A., the Red Cross, the Eucharistic Mission and the U. S. Army.

A majority of the patients were men and children with anemia prevailing. A campaign against hookworm was instituted and instructions as to diet and personal hygiene were given. It is felt that the situation is favorable and no further trouble is anticipated if directions and precautions are observed.

MALARIA CONTROL IN MISSISSIPPI*

By GEORGE E. RILEY, M.D.,
Jackson, Mississippi

Malaria control work in Mississippi for the year 1933 has been continued along the lines outlined and inaugurated in 1930 by Dr. Mark F. Boyd. The operation of this same program for the past four years has demonstrated that it is a sound and practical one.

(1) *Malaria Diagnosis.*—During this period, considerable progress has been made in securing ante mortem laboratory diagnosis. This is indicated by the following figures for the first eight months of the past five years:

Year	No. Deaths Ascribed to Malaria	No. Confirmed by Laboratory	Per Cent Confirmed
1929	185	6	3.2
1930	187	31	16.6
1931	89	23	25.8
1932	139	26	18.7
1933	208	45	21.6

The State Hygienic Laboratory and five county laboratories examined, during the first eight months of 1932, 9,442 slides with 1,031, or 10.4 per cent, positive; and, in the same period of 1933, 12,665 slides were examined with 2,336, or 18.4 per cent, positive.

(2) *Morbidity Reporting.*—During the first nine months of this year, there were 3,597 individual case card reports made in the special malaria morbidity reporting area as follows:

MALARIA MORBIDITY

County	White	Colored	Total
Bolivar	1,174	1,329	2,503
Coahoma	93	18	111
Humphreys	57	37	94
Leflore	61	45	106
Sharkey	59	73	132
Sunflower	188	98	286
Washington	81	28	109
Holmes	21	5	26
Warren	111	33	144
Yazoo	56	30	86
Total	1,901	1,696	3,597

In the other counties of the State, reporting of malaria is by number only, and the report is made at the end of the month.

The success attained is due almost entirely to State and county laboratories. In Bolivar County, this is largely true; however, the physicians of that county report better than in the other counties of this area.

(3) *Malaria Spot Maps.*—Some of the county health officers in their control programs are utilizing the spot maps that have been kept for the past few years. This is notably true in Warren County.

(4) *Educational Work.*—This phase of the program has been emphasized and a new line of endeavor has been entered upon. The importance of correct diagnosis and proper treatment has been stressed and self-diagnosis and self-treatment have been discouraged. An attempt has been made to learn the latest and most effective method of treatment of malaria, and to furnish this information to physicians (never to the laity) at as early a date as possible. In keeping with this policy, the "Sinton Treatment of Malaria" was outlined early in 1932 and this outline sent to every physician in the State. After a survey including about 1,700 cases

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treated with atabrine in Mississippi, and a review of the literature, "A Summary for Malaria Treatment with Atabrine and Plasmochin" was prepared for distribution to physicians.

The Smith-Hughes Schools, which taught screening as a part of their school program last year, have completely screened 162 white, 207 colored, or a total of 369 homes. Each of these projects was used as a demonstration in the community. In addition to the houses screened, these schools installed, at private homes, 354 sanitary privies. This is an example of the splendid work that can be accomplished along general health lines in these schools.

(5) *Minor Drainage.*—The increasing demand for and work done in this phase of the program is demonstrated by the following figures:

Year	No. Surveys	No Miles of Ditches Installed	Acres Reclaimed
1929	83	8.20	
1930	273	37.84	2188.10
1931	323	45.98	4700.50
1932	361	75.20	6122.75
1933*	326	61.85	5058.75
Total	1,366	229.07	18,070.10

*To September 30, 1933.

It is noteworthy that 47 per cent of all work surveyed has been installed.

The minor drainage accomplishments may be briefly summarized as follows:

	Reported to Dec. 31, 1932	Reported first 9 months, 1933	Total to Sept. 30, 1933
No. surveys	1,040	326	1366
No. miles surveyed	448.69	38.99	487.68
No. miles ditches installed	167.22	61.85	229.07
Acres reclaimed	12,884.85	5,058.75	17,943.60
*Cost of installation	$34,735.38	$9,420.93	$44,156.31

*This cost was paid by those actually benefited and includes only cash paid for labor and material.

The foregoing figures include only the work surveyed and promoted by the two engineers in the regular delta and bluff counties. In addition, survey and consultation service were given other counties of the State. In these other counties, 703 miles of ditches were installed at a cost of $65,014.82. Some of this work was paid for by the local government, some by the individual benefited, but the greater part was paid for by relief funds furnished through the Reconstruction Finance Corporation. Some of this work was done by convict labor.

Due to increased interest in fish and game propagation and protection, many projects are being promoted by various groups for raising the water level in existing lakes and creating new lakes. An attempt is being made to insure protection from malaria in such projects. The engineers have, in many instances, prevented such proposed projects from being installed.

(6) *Screening.*—The promotion of screening has been a part of the routine activities of the 24 full-time county health departments. Due to economic conditions, this part of the program has necessarily been directed largely to education. From present indications, a great increase is expected in screening during the next few months.

(7) *Malaria Incidence.*—The influence of the economic and climatological conditions was reflected in all parts of the State. During the past three years the number of malaria cases and deaths were reported as follows:

Region	Number of Cases 1930	1931	1932	Number of Deaths 1930	1931	1932
Delta	7,580	5,415	6,407	121	92	145
Bluff	7,729	6,117	5,601	37	45	68
Northeastern	21,109	15,854	15,825	76	44	70
Southcentral	12,500	8,173	8,048	45	27	39
Coastal	540	288	252	2	3	2
State	49,458	35,847	36,133	281	211	324

In 1933, the figures show, for the first nine months, 51,406 cases, and, for the first eight months, 208 deaths ascribed to malaria. These figures seem to indicate, as do the laboratory reports, and the general opinion of physicians, that there has been a tremendous increase in malaria this year. The indications are, however, that the peak of this epidemic will not equal that of the year 1928. If this is true, then progress has been made.

MALARIA CONTROL IN TENNESSEE JULY 1, 1932-JUNE 30, 1933*

By E. L. Bishop, M.D.,†
Nashville, Tennessee

Because of limitations imposed upon the operating budget of the State Health Department for the fiscal year, it was neccessary to reduce field personnel in malaria control to the lowest minimum consistent with a policy of maintain-

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†Commissioner Tennessee Department of Public Health.

ing fundamental services in the Department as a whole.

With few exceptions, the program for the past year has centered around the engineering phases of malaria control, and more particularly drainage.

Blood Surveys.—In the tier of counties bordering on the Mississippi River, spring and fall blood surveys were continued with a view of determining the trend of prevalence of malaria in relation to the various types of control measures instituted during recent years. Results of these surveys indicate a slight but probably significant increase in malaria prevalence for both the fall of 1932 and spring of 1933.

Housing Improvement.—A large proportion of the rural tenant houses in the South can be rendered mosquito-proof only with extreme difficulty, and most of them are quite unattractive architecturally. During the year, the Department made available to land-owners a housing bulletin showing details of construction, general specifications and bills of materials with estimated costs, for several types of two-, three- and four-room tenant houses that are attractive, comfortable, readily mosquito-proofed, and as economical to construct as the average tenant house at present employed.

Screening and Mosquito-Proofing. — Because of the disturbed economic situation, no general county-wide program of screening and mosquito-proofing was carried out. In Shelby County, the County Health Department operated a screen door factory intermittently to provide for the current needs of the county and the City of Memphis.

Impounded Water Control.—Engineering consultation service was given for two large impounded water projects with respect to anopheline control.

Municipal Mosquito Control.—Twenty-seven cities and towns in central and western Tennessee carried on one or more of the usual mosquito control activities such as drainage, premise inspection and the use of oil or other larvicides. Technical consultation service was rendered by the State Health Department.

Drainage.—The principal malaria control activity during the year was drainage. This was carried out principally through the use of relief labor for ditching, the State Highway Department, especially in connection with roadside borrow-pit drainage, contributing transportation, tools and foremen.

Each full-time county health department in western Tennessee carried on a definite malaria program as a part of its routine work; and in all of these counties with the exception of Shelby, practically all of the drainage was accomplished through the employment of relief labor. In Shelby County, extensive community and town drainage was carried out by the utilization of both relief and penal labor.

The following summary shows for the six counties bordering the Mississippi River, the number of miles of ditching (including roadside borrow-pit drainage) accomplished during the year:

County	No. Miles of Ditching
Lake	128.6
Lauderdale	32.2
Obion	25.0
Dyer	34.5
Tipton	49.7
Shelby	45.0*
Total	315.0

*Exclusive of the City of Memphis.

Practically all of the ditching in Shelby County was for community or town drainage; in the other counties, the ditching was principally along State and county highway rights-of-way.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
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A NEW METHOD OF ESTIMATION OF BLOOD FAT AND PROTEIN

In the early days of blood chemistry, 40 or more c. c. of blood were often withdrawn for determination of a single constituent. Now, ten c. c. are considered ample for quantitative analysis of a dozen blood components. The gravimetric procedure, that is isolation and weighing of the unknown substance, preceded most other methods of analysis. Later titration of substances in solution was employed, and in the last two decades colorimetric methods of analysis have been increasingly popular. The eye is able to detect changes in color intensity which indicate practically imponderable differences of the amount of a substance in solution. Colorimeters to aid the eye in making these comparisons have become more or less elaborate. The colorimetric method is used to estimate the various nitrogen fractions in the blood, as nonprotein nitrogen, urea, uric acid, creatinine, and amino acid, as well as sugar, and phosphorus and other substances in small samples of blood which may be withdrawn frequently with little inconvenience to the patient.

It was a logical and necessary development that the discovery of microchemical methods of sugar estimation in the blood came before the discovery of insulin, since with accurate analysis of sugar in small quantities of blood, the isolation and standardization of this drug and intelligent treatment of diabetes would have been impossible. Quantitative, as opposed to qualitative, chemical methods are increasingly significant in modern diagnosis. In order that they may be practical they must be capable of application to very small samples of biologic material.

The proteins and lipids have yielded a little less rapidly to microchemical methods than have the sugars and simple nitrogen compounds. A new approach to the estimation of fats and proteins in the blood, which has been extensively employed abroad, is described by Professor Dr. Gorter,[1] of Leyden, The Netherlands. The determination itself is not extremely difficult, though it depends upon the application of principles unfamiliar to the average physician, and the use of an instrument to measure surface tension.

Complex substances not usually considered soluble in water, says Dr. Gorter, may contain within the molecule a portion which is water soluble. If these substances, for example, a fat, are brought in contact with water, a part of the molecule dissolves in the water and the remainder spreads over the surface in a film which is only one molecule thick. Oil spreads upon water because one part of the molecule is soluble and the remainder insoluble. In fatty acids, the carboxyl (COOH) group is soluble and the paraffin chain (C_nH_n), if as long as ten atoms of carbon, is insoluble. If a fat is allowed to spread over water in this way, its one-molecule film may be pushed together by a mechanical barrier till all the molecules are in contact, at which point there is a sudden change in surface tension. If one knows the space occupied when all the molecules are in contact, the quantity of the unknown fat in the original biological sample may be calculated.

The question of whether the red blood cell has an enveloping membrane has been studied by this method. According to Gorter, it has a lipoid membrane, and the permeability of the membrane probably changes in the presence of different ions, such as calcium. Most proteins, he says, may be measured by the same method, if care is taken to employ the correct hydrogen ion concentration. Typical variations in the protein content of blood serum may be demonstrated in disease. In athrepsia, for example,

1. Gorter, E.: Spreading in a Monomolecular Film: A Method for Studying Biologic Problems. Amer. Jour. Dis. Child., 47: 945, May, 1934.

the total protein content of the serum is low, especially the globulin; in nephrosis there is a decrease of the albumin fraction; in dehydration a high total protein; in active tuberculosis a high globulin. Tryptic activity in a protein preparation may be measured by the change in molecule size.

There are perhaps various little-studied constituents of the blood and of other tissues, which are as significant to clinical medicine as the widely used sugar and nitrogen determinations. They wait the simplification of microchemical methods for their investigation in large groups of clinical cases. Measurements by the use of the monomolecular film offer a promising lead.

GLEANINGS FROM RECENT JOURNALS

Candy and Calcium Retention.—The black and decaying teeth of the child who is "fed on trash" are frequently noted, and belief in the ill effect of candy on tooth structure is widely held, though it rests on rather indefinite evidence. Hubbell and Koehne,[1] of the University of Michigan School of Dentistry, have made elaborate metabolic studies of the effect of sugar in the diet on the retention of nitrogen, calcium and phosphorus in children. The intake and excretion of these elements over seven-day periods in children on a good standard diet, and on the same diet with increasing amounts of candy were observed. Calcium and phosphorus metabolism, of course, should bear a close relationship to dental development, since these elements make up a large proportion of the solid matter of the teeth.

Contrary to expectation, on a high candy intake there was a tendency to retain more nitrogen and phosphorus than on the standard basal diet. Calcium retention, however, decreased in five of seven children on the highest sugar diet.

Metabolic studies made as these, over periods of a week, are exceedingly troublesome and very instructive. Seven days of food analysis and of collection and biochemical analysis of total feces and total urine is a large task. Of the life of the individual, it is, of course, only a brief sample. It is quite significant that calcium loss in the body was detected even in these comparatively brief periods of study. Calcium is the element most frequently deficient in the dietary. Further calcium drain by consumption of excess sweets would increase the danger of an inadequate supply of this mineral.

Hypertension and Kidney Blood Supply.—Goldblatt[2] and his associates at Western Reserve University have attempted to produce hypertension in dogs by ligating the branches of the renal artery. They found that ischemia thus localized to the kidneys was a sufficient condition for the production of persistently elevated systolic blood pressure up to 200 to 280 mm. of mercury. A moderate constriction resulted in elevation of the systolic pressure without signs of materially decreased renal function. Almost complete constriction of both main renal arteries, from the beginning resulted in great elevation of systolic blood pressure accompanied by severe disturbance of renal function and uremia.

This is a type of hypertension which can be profitably studied. Apparently the elevation of blood pressure is the result of failure of excretion of toxic products. The work suggests that very slight kidney damage by other means might produce the same effect.

Pathology of Pernicious Anemia.—It is a rather widely accepted belief that the stomach secretion of pernicious anemia is lacking not only in hydrochloric acid but also in a "specific intrinsic factor" described by Castle and his associates. Lean beef, vitamin G and various other foods which are ineffective in the treatment of pernicious anemia, may be activated by incubation with normal stomach juice, after which they readily stimulate blood formation and remission of symptoms in pernicious anemia.

Isaacs and Goldhamer,[3] of the Simpson Memorial Institute in Ann Arbor, say that the lack of the intrinsic factor in pernicious anemia is by no means absolute. The entire stomach secretion in this disease, according to them, is diminished. The average secretion per hour in thirty-two collections from five patients with true pernicious anemia was 20 c. c., as compared with an average normal of about 150 c. c. The juice from five untreated patients in relapse with this disease was collected and stored in ice till 1,500 c. c. were available. Portions of this were then incubated daily with lean meat and hydrochloric acid. After the resulting

1. Hubbell, R. B.; and Koehne, M.: Effect of Varying the Sugar Intake on the Nitrogen, Calcium and Phosphorus Retention of Children. Amer. Jour. Dis. Child., **47**:988, May, 1934.

2. Goldblatt, Harry; Lynch, J.; Hanza, R. F.; and Summerville, W. W.: Studies on Experimental Hypertension. Jour. Exper. Med., **59**:347, March, 1934.

3. Isaacs, R.; and Goldhamer, S. M.: Role of Decreased Amount of Gastric Secretion in the Production of Pernicious Anemia. Proc. Soc. Exper. Biol. & Med., **31**:706, March, 1934.

product had been fed for ten days to a patient with typical pernicious anemia, the typical reticulocytosis resulted, with increase in the red count and hemoglobin.

This is of course quite contrary to the generally accepted belief that pernicious anemia may be diagnosed by the failure of its stomach juice to activate lean meat to produce a reticulocytosis in another case of the same disease. Confirmatory or contradictory evidence on the subject is to be expected.

TWENTY-FIVE YEARS AGO

FROM JOURNALS OF 1909

Medical Ethics and Commercialism.[1]—"The subject I have chosen for this paper, 'Medical Ethics and Commercialism,' was suggested to me by an advertisement appearing in the daily papers of this city several days since, offering employment, upon a salary, to a regular practicing physician, who was to devote part of his time to attending five hundred employees. * * *

"Gentlemen, are you aware that upwards of ten thousand persons in this city [Washington, District of Columbia] who are as able to pay for medical services as our average pay patient are receiving medical attention and treatment from regular licensed physicians in general practice, whose average fee is about 15 cents per call and prescription, received in guise of salaries under contract and employment agreements? And are you further aware that these physicians, so employed and in receipt of these salaries under contract, by means of these arrangements obtain entree into the families of these patients and thus introduce themselves professionally to some thirty thousand other prospective and probable patients? * * *

"Gentlemen, we have here an entered wedge, the spirit of commercialism, that unless promptly and decisively dealt with will split our association asunder. * * *

"* * * policemen and firemen are thus unnecessarily pauperized by this free medical service. If their salaries are considered too small to enable them to pay for medical services of their own selection, then increase them. And why free medical service only? Why not also free tailor, butcher, barber, grocer, lawyer, undertaker, etc.?"

1. Emmons, Charles M.: Medical Ethics and Commercialism. Sou. Med. Jour., **2**:850, 1909.

The Treatment of Thyroidism by a Specific Cytotoxic Serum.[2]—"The serum is prepared by the inoculation of animals with pure proteids from human thyroid glands. * * * In the severe rapidly developing type of exophthalmic goiter, which has many of the characteristics of an acute infection, a very marked improvement results from small amounts of serum, an effect comparable to that seen in diphtheria following antitoxin. * * * Hypothyroidism and hyperthyroidism may coexist and the treatment consists in giving sheep-thyroid proteid to answer physiologic needs, while the abnormal products of the patient's own gland are neutralized by the serum. * * * Each case * * * must be studied in order to determine whether the condition of hypothyroidism or hyperthyroidism predominates. * * * Of 246 cases reported by Rogers and Beebe, 227 were of the class favorable for serum treatment. The results show about 30 per cent of patients cured of subjective symptoms with objectively nothing more than a gland discoverable on deep palpation. About 50 per cent * * * improved."

Pellagra.[3]—"The treatment of acute pellagra is of no avail. We have reason to suspect that the epizootic meningitis among horses is due to the same cause as pellagra in man. If the above mentioned organism is the cause of pellagra and the horse is susceptible, we have reason to hope that the serum therapy will soon come to our assistance. It has been shown that the blood of healed pellagrins is curative in guinea pigs experimentally inoculated with pellagrous material."

Vaccines in Endocarditis.[4]—"Following the method of Sir Almroth Wright of the injection of homologous or authochthonous vaccines, I have treated a series of cases of septic (streptococcal) endocarditis and pyemia with results which have again demonstrated its effectiveness. * * * Three cases of septic endocarditis were cured, with one of serious pyemia, and in several other cases of septic endocarditis there was clinical evidence that the septic process had been completely controlled, although subsequent death ensued from such complications as tuberculosis or pneumonia, which as yet are beyond the influence of vaccine treatment. * * *"

2. Editorial, Treatment of Thyroidism by a Specific Cytoxic Serum. J.A.M.A., **53**:210, July, 1909.

3. Wood, Edward J.: The Appearance of Pellagra in the United States. J.A.M.A., **53**:274, July, 1909.

4. Thompson, W. Gilman: Clinical Experiments with Homologous Vaccines in the Treatment of Septic Endocarditis and Pyemia. Amer. Jour. Med. Sci., **138**:169, 1909.

DR. JAMES SOMERVILLE McLESTER

PRESIDENT-ELECT OF THE AMERICAN MEDICAL ASSOCIATION

It is the impression that few Southern physicians have attained the high honor of the presidency of the largest and most influential organization of medical men in the world. This was doubtless true in the post-Civil War epoch and in the early part of this Century. The post-World War period has seen a renaissance of Southern leadership in medicine nowhere more clearly manifested than by an examination of the list of men who have headed the American Medical Association in the last ten years, to whom the Southern Medical Association may point with admiration. In 1924, Dr. William D. Haggard, of Nashville, was made president. Dr. Edward H. Cary, of Dallas, Dr. Dean Lewis, of Baltimore, Dr. William Gerry Morgan, of Washington, and Dr. William S. Thayer, of Baltimore, are among the distinguished names of recent American Medical presidents, outstanding physicians from the South, to which Dr. McLester's name is now to be added. One notes that in this list of six recent presidents from the South, the far Southern states, Tennessee, Alabama and Texas, share honors with the more northerly of the Southern group.

Dr. McLester was born at Tuscaloosa, Alabama, January 25, 1877. He graduated from the University of Alabama in 1896 and studied medicine at the Medical School of the University of Virginia, where he received his M.D. degree in 1899. He did postgraduate work at Goettingen, Freiburg, Berlin and Munich, and returned to Birmingham to engage in the practice of internal medicine.

During the World War, Dr. McLester served as Major at the Base Hospital, Camp Sheridan, in 1917, and as Lieutenant-Colonel in the American Expeditionary Force, being commanding officer of Evacuation Hospital 20 in 1918 and consultant in the same year. He was subsequently commissioned Colonel in the Medical Reserve Corps. He is a well known student of metabolism and nutrition and has written many papers on these subjects. In 1920 he was elected president of the Medical Association of the State of Alabama, and also Chairman of the Section on Internal Medicine of the American Medical Association. He was one of the early active members of the Southern Medical Association and has been a regular attendant and popular leader at its meetings since 1907. He was Chairman of its Section on Medicine in 1917 and has published a number of papers in the SOUTHERN MEDICAL JOURNAL which have considerably influenced the trend of Southern practice. He is the author of the text-books, "Nutrition and Diet in Health and Disease" and "Diagnosis and Treatment of Disorders of Metabolism," which are clearly and judiciously written and are widely used in this country and abroad. He contributed the chapter on the mediastinum in the "Oxford Medicine" and on syphilis in Cecil's "Practice of Medicine."

DR. JAMES SOMERVILLE McLESTER
Birmingham, Alabama
President-Elect, American Medical Association

From the beginning of his entrance into practice, he has stood for the best in hospital organization, in medical teaching, and in medical diagnosis and treatment. He has modified his methods from year to year to conform with the most progressive wing of the medical party, and has instinctively avoided fads or fallacies. He has been on the Medical Staff of the Hillman Hospital in Birmingham for many years; and more recently Physician-in-Chief and Chairman of the Medical Advisory Board. He is Professor of Medicine at the University of Alabama and has been generous in giving his time to medical teaching. It is particularly fortunate that the South is represented in the national organization by a man of Dr. McLester's high type.

San Antonio, Where We Meet

SAN ANTONIO*

San Antonio is the commercial center for that vast empire known as South Texas. With its seemingly tropical climate it is the natural destination for many thousands of people who are looking for a place to spend their lives in peace, contentment and happiness where health goes hand in hand with prosperity.

San Antonio is not a city of excessive personal wealth. Wealth seems to be pretty well distributed amongst its people. The population as a class are home owners living in pretty cottages surrounded by plenty of space with sunshine, light, air, green lawns, beautiful flowers and shrubbery. The homes of the wealthy cannot be surpassed in any city for architectural beauty with spacious grounds carefully and beautifully landscaped. The stranger coming to San Antonio is impressed with the apparent lack of poverty.

The winters in San Antonio are mild and spring-like. When the breath of a norther b'ows in from the cold, icy north, the glorious rays of a golden sun soon turn a chilling atmosphere into a balmy, glorious day. In winter time people do not wear heavy woolen clothing. Overcoats are scarcely seen on men; women wear spring sport ensembles, light woo'ens and silk.

A winter in San Antonio with its setting of green grass, shrubbery, waving palms, legustrum trees, majectice live oaks, mountain cedars, privet hedges, blooming roses and bright colored flowers is more like a spot in a Garden of Eden than just another American city. One of the glories of a winter in San Antonio is its perpetual sunshine and a sun whose health given rays penetrate deep into a memory never to be forgotten. Gray leaden skies which bring gloom, discontentment and despair are unknown in this beautiful city.

The summers in San Antonio are not only livable but they are delightful. The sun is hot, but no hotter here than it is in the North and East. The atmosphere is dry with no humidity and no one feels the heat. There is always a cool breeze blowing continuously over the country day and night, known as the Gulf breeze, which has no chill in it; just a balmy breeze that produces an atmosphere of romance and dreams. At night time the atmosphere is so c'ear that the stars are not only brilliant, but the starlight is like twilight and the moon is truly a lovers' moon with a flood of silvery light brighter than the dawn of day.

There is an average rainfall of 27 inches without any rainy season. Rubber shoes and umbrel'as are unknown here and there is no dampness or humidity at any time.

San Antonio has a blessing in its water supply which no other city has. The water is subterraneous, coming from an artesian belt. The city water supply is connected directly with flowing wells and the water never sees the light of day until it flows out of a water faucet. There is one well in San Antonio which has a capacity flow of thirty-five million gallons per day.

Besides the wonderful climatic condition and romance, San Antonio offers everything that is modern. It is a beautiful city with well paved streets, many parks, golf links, zoological gardens, a museum, polo fields, tennis courts, bridal paths for horseback riding and many points of interest.

Paved roads and highways radiate in every direction from San Antonio. Thirty miles north and west is mountain scenery with the grandeur of Co'orado, although not quite so high. To the south and west is ranch country which is full of cowboy romance; some of the ranches contain over a million acres of land. San Antonio is only a three-hour drive to the Gulf of

The famous Sunken Garden located in Brackenridge Park.

Mexico with the most beautiful bays for boating and fishing. This is the fisherman's paradise, where the sport of catching tarpon and king fish will keep the fisherman busy and if that proves tame to him he can go out into the Gulf and get any size sharks and other big fish he likes to fish for. It is nothing to catch several hundred pounds of trout and red fish in one day's fishing in the bays and in the winter time fishing is only a part of the fun for the sportsman. Here is where wild duck and geese spend the winter by the thousands.

San Antonio is the center of the hunter's paradise; dove, white-winged pigeons, quail, both Mexican quail and bob whites, wild turkey and deer are plentiful. Rabbits and squirrels are too common to shoot. If the hunter wants big game, he can soon be taken where panthers, bob cats, Mexican lions and bears are easy to find.

Just a short drive from San Antonio to the south is the wonderful winter garden district and the Rio Grande Valley with its winter gardens, its orange and grapefruit orchards; a veritable land of paradise which looks to San Antonio as its commercial and trade center.

*Prepared by Mr. Howell W. Jones, Secretary, Convention Department, San Antonio Chamber of Commerce, for Dr. P. I. Nixon, Chairman of Publicity for the Southern Medical Association's San Antonio meeting.

After San Antonio, Mexico

MEXICO*

Realization of what the Republic of Mexico has to offer to the traveler is becoming more and more widespread every year, with the result that increasing numbers of vacationists are visiting this country and large organizations are holding conventions in its capital. With this foreign country so close at hand, it is not necessary to take an extended sea voyage or to have unlimited leisure to satisfy the universal craving for travel in strange lands. Mexico can be reached overland in the same time required to go to California. And it is not necessary to worry over transportation on an unfamiliar system, as the Missouri Pacific Lines provide through service to Mexico City from St. Louis and Memphis via San Antonio.

Bordering the states of Texas, New Mexico, Arizona and California, Mexico extends southward in an ever-narrowing width to the countries of Central America, and comprises twenty-seven states, three territories and a Federal District, with a total area of 785,881 square miles. On its west coast are the blue waters of the Pacific and on its east the Gulf of Mexico, with the high ranges of the Sierras running between. Its vast plains, plateaus and coasts are rich in oil, minerals and agricultural products, its cities modern and progressive, with the lingering touch of the grandeur that marked them during their Indian and Colonial periods. There are parts of Mexico that are somewhat warm during the summer season, but Mexico City, the capital, is blessed with a year 'round cool and invigorating climate that owes its 'asting pleasantness to the high altitude at which the city has been built. Days are comfortable and nights cool enough for a wrap at all times, and there is a marked difference between sunlight and shade.

Many archeologists, who have studied the ruins that lie between the soil of Mexico, are of the opinion that this country was the cradle of civilization on the American Continent. It is a matter of definite record that the Aztecs had reached a high point of culture and refinement 'ong before the first colonies were estab'ished on our own shores. Cortez was astounded by the cities that he found during the course of his conquest and by the efficacy of the weapons used in their defense. A lavish use of precious stones and metals was only a slight indication of the immense wealth that the Aztecs possessed, but the manner of their use, the delicacy of their artistry and the perfection of their settings and workmanship were high marks of tribute to the intelligence and learning of this ancient race. Mexico City, itself, the same Mexico City that Cortez captured and ru'ed, the same that Maximilian glorified with the splendor of a European court and the same that offers a hospitab'e welcome to the traveler today, was the original, and has remained the permanent, capital of Mexico.

The Republic of Mexico is today guided by a president chosen by the people in a popular election, but it has known the stern, as well as the vascillating, rule of Indian princes, a dictator, Spanish viceroys and an emperor. Its history is as ancient and as interesting as that of any country in the world. Its deeds have been as stirring, its architecture as magnificent, its people as cultured and its world influence as great as any of them. The fabled Seven Cities of Cibola, the legendary El Dorado, the Fountain of Perpetual Youth, and other myths that were invented or imagined by the wandering adventurers who followed the difficult course charted by Columbus, led the first few seafarers, more by accident than design, to the shores of Mexico. Some of these, returning to their home ports, started the stories of vast wealth in Mexico which were responsible for Cortez' expedition that resulted in his historic conquest.

The original Aztec Calendar Stone and other relics of early Mexican civilization in the National Museum in Mexico City.

The tourist visiting Mexico will find that it has all the charm, all the advantages and all the outstanding attractions that are of interest to a stranger in a foreign land. It is separated from our own United States only by a river and an imaginary line drawn, not by nature, but by political agreement, and yet, once below this border, there is a perceptible difference that is at once apparent. Somewhere within the length and breadth of Mexico are found all of the attractions that lend glamour and interest to all the countries of the world. Mexico City is its Paris; Vera Cruz its Southampton; San Juan Teotihuacan, the site of its pyramids, its Egypt; Cholula its Rome; and the high Sierras, hovering eternally in the background, its Switzerland. It is a nation of churches, of magnificent cathedra's that outnumber and outshine the architectural masterpieces of the Continent.

Mexican history, even in its driest form, reads like some highly colored page of romantic fiction. There is something so indomitably vivacious and light-

*Prepared for the SOUTHERN MEDICAL JOURNAL by the Publicity Department of the Missouri Pacific Lines.

hearted about these people, some strain of joyousness that puts an eternal song upon their lips and an instinctive love of beauty in their hearts that it will not be hidden even in the recital of the most monotonous details. Music softly plucked from muted strings, the rhythmic throb of castanets and the caressing softness of a tropic night wherein romance is born—this is the Mexico of fiction, but it is not too greatly exaggerated for the Mexico of reality.

Book Reviews

The Management of Fractures, Dislocations and Sprains. By John Albert Key, B.S., M.D., Clinical Professor Orthopedic Surgery, Washington University School of Medicine, St. Louis, and H. Earle Conwell, M.D., F.A.C.S., Orthopedic Surgeon for the Tennessee Coal, Iron and Railroad Company, Birmingham, Alabama. 1164 pages with 1165 illustrations. St. Louis, Missouri: The C. V. Mosby Company, 1934. Cloth, $15.00.

This work is one of the most extensive ever written on this subject and is approached in a comprehensive and orderly manner. The forms of treatment described are those which the authors have used and have found reliable and practicable. The book cannot be regarded in any sense as an atlas.

General principles involved in the treatment are fully discussed as are all possible complications, with special reference to the diagnosis. Dislocations and sprains are described in connection with fractures, and not in a separate chapter as is usual in most treatises. This gives a much clearer conception of these subjects, especially of the differential diagnosis of fractures in the vicinity of joints and dislocations. The legal aspect of fractures, compensation insurance and malpractice suits are also considered.

There are two excellent chapters by authorities on special subjects. These are "Fractures of the Skull and Brain Trauma," by the late Charles Edward Dowman, and "Fractures of the Jaws and Related Bones of the Face," by J. B. Brown.

A careful anatomical review is made of each part of the body, with special reference to the factors involved in the mechanism of the fracture, sprain or dislocation. The book is thoroughly up to date, profusely illustrated and written in simple clear language. The discussion of the management of fractures will do much toward increasing knowledge of this neglected field.

The book is highly to be recommended.

New Patterns in Sex Teaching. By Frances Bruce Strain. 242 pages. New York: D. Appleton-Century Company, 1934. Cloth, $2.00.

The author has shown the way to guide children through the period of beginning sex consciousness to adolescence. The problem is handled sanely and with simple verbiage. Over one hundred questions that children are prone to ask are explained in such a manner as to satisfy both child and parent.

The Doctor and Citizenship. By Thurman D. Kitchin, M.D., President, Wake Forest College, Wake Forest, North Carolina. 89 pages. Boston, Massachusetts: The Christopher Publishing House, 1934. Cloth, $1.50.

In a series of short essays and addresses, Dr. Kitchin admonishes the medical profession to maintain the position of the doctor in the community as a person of culture and understanding. The individual harboring the disease must not be forgotten. Medicine, he says, is not amenable to lay control or rubber stamp methods. There is always the personal equation to be considered.

Modern Drug Encyclopedia and Therapeutic Guide. A presentation of 8,160 modern, non-pharmacopeal, medicinal preparations, comprising: 1,878 drugs and chemicals, 535 biologicals, 860 endocrines, 1,564 ampule medicaments, 209 medical foods, 129 mineral waters, 2,344 individual and group allergens and 642 miscellaneous products. By Jacob Gutman, M.D., Phar.D., F.A.C.P., Consulting Physician, Manhattan General Hospital, New York; Formerly Professor of Materia Medica College of Dentistry, University of State of New Jersey. 1393 pages. New York: Paul B. Hoeber, Inc., 1934. Cloth, $7.50.

This treatise contains information about the more important of the non-pharmacopeal preparations that have been developed by the different drug companies. The statements of the manufacturer as to the indication and use of the preparations are accepted without criticism or curtailment except as limited by space in the volume. There is no designation as to whether such drugs are Council-accepted, although a reference bibliography is appended. Eight thousand one hundred and sixty products are described as being in popular usage among the members of the medical profession, and of these 346 preparations are described as having compositions that are not fully defined. The book describes combinations, endocrine products, hypodermic medications, biologicals, allergens, foods, beverages and mineral waters. It contains a therapeutic index and distributors' index. The publication of this book emphasizes the influx of proprietary medicines into usage by the medical profession.

The Road to Adolescence. By Joseph Garland, M.D., Physician to Children's Medical Department, Massachusetts General Hospital; Consulting Pediatrician, Massachusetts Eye and Ear Infirmary; Instructor in Pediatrics, Harvard Medical School. 293 pages. Cambridge, Massachusetts: Harvard University Press, 1934. Cloth, $2.50.

Dr. Garland writes this book from the standpoint of the Children's Charter as set forth by the White House Conference on Child Health and Protection. Lessons in anatomy, care of the body, nutrition and diet are given in their respective chapters. As all children are prone to develop infectious diseases, emphasis is placed on their recognition and care. The chapter on vaccines and serums does not describe the single injection of toxoid which has been in use about two years. The book will serve to aid the parent in rearing the child, but its briefness will not appeal to the thinking mother or father. This lack is somewhat offset by the references that are appended to each chapter.

The 1933 Year Book of General Therapeutics. By Bernard Fantus, M.S., M.D., Professor of Therapeutics, University of Illinois College of Medicine. 464 pages, illustrated. Chicago, Illinois: The Year Book Publishers, 1934. Cloth, $2.25.

The past year has not been lacking in new therapeutic agents and procedures, the more important of which are chronicled in this book. Among the more important papers is that on "Chemic Messengers of Nerve Action," from a lecture by W. Langdon Brown. E. P. Johns presents an interesting report on the oral use of bacillary dysentery vaccine as a prophylactic and the injection treatment of hemorrhoids is described by F. D. La Rochelle. The toxicity of *alpha* dinitrophenol in the treatment of obesity is definitely proven by a series of articles. Basal anesthesia is undergoing rationalization and Carl P. Wagner gives an excellent review of the pharmacologic action of the barbiturates. The man who signs the prescriptions will find a great deal of useful knowledge in these pages.

The 1933 Year Book of Dermatology and Syphilology. Edited by Fred Wise, M.D., Professor of Dermatology and Syphilology, New York Postgraduate Medical School and Hospital of Columbia University; President (1933) of the American Dermatological Association, and Marion B. Sulzberger, M.D., Associate in Dermatology and Syphilology, New York Postgraduate Medical School and Hospital of Columbia University. 458 pages, illustrated. Chicago, Illinois: The Year Book Publishers, 1934. Cloth, $2.25.

This year book is pre-eminently practical; over one-sixth of the text is devoted to therapy. The short treatise on the "Modern Treatment of Acne Vulgaris," by the authors, gives to the general practitioner a definite detailed management for these cases. The addition of a supplementary bibliography will enable those interested to delve deeper into the literature.

The 1933 Year Book of Obstetrics and Gynecology. Obstetrics edited by Joseph B. DeLee, A.M., M.D., Professor of Obstetrics, University of Chicago Medical School; Chief of Obstetrics, Chicago Lying-In Hospital and Dispensary, in affiliation with the University of Chicago. Gynecology edited by J. P. Greenhill, B.S., M.D., F.A.C.S., Associate Professor of Gynecology, Loyola University Medical School; Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Cook County Hospital. 630 pages, illustrated. Chicago, Illinois: The Year Book Publishers, 1934. Cloth, $2.50.

The progress in obstetrics and gynecology as recorded in this year book are quite satisfactory. An interesting paper is one by H. Naujoks describing the obstetric significance of varicosities. The treatment of eclampsia is tending ever more to the conservative and the use of cesarean section in this condition is derided by the editor. There are a great many new efforts being used to make labor easier, but spinal anesthesia seems to be going into the discard in this condition.

The gynecologic section offers a paper by B. C. Hirst listing the four major problems in gynecology as carcinoma of the uterus, maternal mortality in childbirth, sterility and birth control. E. Allen calls attention to the irregularity of the menstrual function even in those women who believe themselves absolutely regular. The limitations of glandular and hormone therapy in menstrual disorders are being brought to the fore. Both sections of this book are injected with vivacity by the pithy and timely remarks of the joint authors.

The 1933 Year Book of Neurology and Psychiatry. Neurology edited by Peter Bassoe, M.D., Clinical Professor of Neurology, Rush Medical College of the University of Chicago. Psychiatry edited by Franklin G. Ebaugh, A.B., M.D., Director, University of Colorado Psychopathic Hospital; Professor of Psychiatry, University of Colorado School of Medicine; Director, Division of Psychiatric Education, National Committee for Mental Hygiene. 471 pages, illustrated. Chicago: The Year Book Publishers, 1934. Cloth, $2.25.

This year book consists of two parts: neurology and psychiatry. Further explanation is offered about the Argyll-Robertson pupil, there are resumés of the newer work on epilepsy and migraine, the treatment of skull fracture is debated pro and con, epidemic encephalitis is quite fully discussed and new uses for sympathectomy are given. The psychiatric literature shows a growing interest on the part of the practitioner in the mental processes of his patient. Forensic psychiatry has also felt an increased interest. This text offers the general practitioner help toward insight into the mental and nervous processes of his patient.

I Know Just the Thing for That. By J. F. Montague, M.D., Medical Director, New York Intestinal Sanitarium. 265 pages. New York: The John Day Company, 1934. Cloth, $2.00.

A book written by an internist advising people with aching and complaining "food canals" to be loth to accept the advice of every person who knows just the thing for that. The public will enjoy this book and even the medico can get a "kick" from the whimsical and entertaining writing of Dr. Montague. Among the many troubles described are constipation, cathartics, roughage, biliousness, lubrication, foods, fads and diets and the remote effects of intestinal derangements. Many truths are deliciously served.

Gonorrhea in the Male and Female. By P. S. Pelouze, M.D., Associate in Urology and Assistant Genito-Urinary Surgeon at the University of Pennsylvania. Second Edition, revised. 440 pages with 92 illustrations. Philadelphia: W. B. Saunders Company, 1931. Cloth, $5.50.

This book first appeared five years ago and was restricted to the discussion of gonorrhea in the male. The present edition has been enlarged to include the manifestations and treatment of this disease in the female. A chapter has been added on gonorrheal ophthalmia and the remote manifestations and complications have been more fully described. The author has described his methods of treatment with such nicety and clearness that they are easily followed and should lead to an approximation of the results that he has been able to obtain in his own extensive practice.

Rhythm of Life. A Guide to Sexual Harmony for Women. By Sofie Lazarsfeld. Translated by Karsten and E. Pelham Stapelfeldt. 329 pages, illustrated. New York: Greenberg Publisher, 1934. Cloth, $5.00.

This book serves the purpose of presenting the woman's side of the sex problem.

It is written in a popular style for lay readers. In it are discussed the development of marriage, biological conditions, and the sex relationships of husband and wife. A large number of case histories serve to illustrate the author's points. The book should banish the mental strain which some women labor under in their sex relationships and bring them to a brighter mental integrity.

Southern Medical News

INFORMATION WANTED REGARDING CONGENITAL MALFORMATIONS OF CHILDREN

The Gynecean Hospital Institute of Gynecologic Research of the University of Pennsylvania is conducting an intensive study of families into which congenitally malformed individuals have been born. Special interest centers in families in which malformations have appeared in two or more children. Physicians who have knowledge of any such families are urged to communicate with Dr. Douglas P. Murphy, Gynecean Hospital Institute, University of Pennsylvania, Philadelphia, Pennsylvania.

ALABAMA

Dr H. Earle Conwell, Fairfield, was the guest speaker in the Section on Surgery at the recent annual meeting of the Mississippi State Medical Association at Natchez.

Dr. Thomas Ford Huey, Jr., Anniston, and Miss Sybil Parrish Flowers were married in April.

Deaths

Dr. Francis Marion Thigpen, Montgomery, aged 66, died April 22 of influenza and cardiorenal complications.

Dr. Alfred Smith Frasier, Dothan, aged 53, died June 14.

Dr. Wilson Alpheus Smart, Clayton, aged 72, died April 1 of heart disease.

ARKANSAS

The Desha County Medical Society has elected the following officers for the coming year: Dr. C. H. Kimbro, Tillar, President; and Dr. J. C. Chenault, McGehee, Secretary-Treasurer.

Dr. Charles S. Holt, Fort Smith, owner of St. John's Hospital, has closed the St. John's Hospital and has assumed the management of Sparks Memorial Hospital under a ten-year contract, where he will take care of patients of the Holt-Krock Clinic.

Dr. W. G. Hodges, Malvern, was recently reappointed City Health Officer.

Dr. J. T. Powell, Gravette, is the newly elected Director of the Gravette Community Club.

Dr. Roy Millard, Dardanelle, was recently elected Vice-President of the newly organized Lions Club.

Dr. John Mc. Smith, formerly of Little Rock, has moved to Russellville and become associated with the Smith-Gardner Clinic.

Dr. Robert Hood, Russellville, was recently elected First Vice-President of the Lions Club at Russellville.

Dr. Virgil Payne, formerly of Memphis, Tennessee, has located at Pine Bluff, where he will practice eye, ear, nose and throat.

Dr. Euclid Monroe Smith, Hot Springs National Park, and Miss Madge Eloise Wootton were married recently.

Deaths

Dr. James Ozwill Nicholson, Lead Hill, aged 58, died February 27.

Dr. William Edward Hughes, Pocahontas, aged 64, died March 27 of chronic nephritis and uremia.

Dr. Thomas E. Hodges, Rogers, aged 74, died March 25 of influenza and myocarditis.

Dr. J. B. Kilgo, War Eagle, aged 79, died April 14.

Dr. L. G. McElhany, Success, aged 55, died April 13.

DISTRICT OF COLUMBIA

Newly elected officers of the Medical Society of the District of Columbia for the coming year are: Dr. A. B. Bennett, President; Dr. Ralph M. LeComte, First Vice-President; Dr. Ella M. A. Enlows, Second Vice-President; and Dr. Coursen B. Conklin, re-elected Secretary-Treasurer; all of Washington.

Georgetown Clinical Society, composed of alumni of the medical department of Georgetown University, has elected the following officers for the coming year: Dr. Grafton Tyler Brown, President; Dr. J. Bay Jacobs, Vice-President; Dr. Joseph J. McHale, Secretary-Treasurer; Dr. William P. Herbst, Chairman of Nominating Committee; and Dr. J. Francis Rogers and Dr. C. H. McEnerney, Membership Committee; all of Washington.

Deaths

Dr. Richard L. Barrington, Washington, aged 69, died suddenly April 3 of heart disease.

Dr. James E. Houghton, Lieutenant Commander, Medical Corps, United States Navy, an associate member of the Medical Society of the District of Columbia, aged 43, died May 3.

FLORIDA

Dr. L. M. Anderson, Lake City, has been elected by the House of Delegates of the Florida State Medical Association to life membership in the Association, this being the first time this honor has ever been conferred upon a member of the Association.

The Graduate Course for Doctors of Medicine in Florida, conducted by the General Extension Division of the University, and sponsored by the Florida Medical Association, was held at the University of Florida during June.

Dr. T. S. Field, Jacksonville, has been elected to succeed Dr. John E. Boyd, deceased, as President of the St. Vincent's Hospital Staff. Dr. Frederick J. Waas was elected Vice-President; and Dr. Robert B. McIver, Secretary-Treasurer; both of Jacksonville.

Dr. A. C. Walkup, St. Augustine, has been appointed to succeed Dr. Gordon Fletcher, resigned, as Assistant Chief Surgeon of the East Coast Hospital.

Dr. Carl D. Hoffman, Orlando, has been taking work the past few weeks at the Mayo Clinic and at the University of Washington Medical School, St. Louis.

Dr. M. W. Spearman has moved to Lake City from Chickamauga, Georgia, and opened offices for the practice of medicine.

Dr. T. E. Morgan has located at Lake City and is temporarily associated with Dr. L. M. Anderson. Dr. Morgan was until recently a district medical officer of the State Board of Health.

Dr. Charles B. Mabry, Jacksonville, has received a promotion from Captain to Major in the Medical Reserve Corps.

Dr. C. W. Bartlett, Tampa, has moved into new offices on the third floor of the First National Bank Building.

Dr. L. Y. Dyrenforth, Jacksonville, has received the degree of Ch.E. (Chemical Engineer) from the University of Florida.

Dr. Nelson T. Pearson, Miami, recently made a trip from Miami to Nassau and Havana as Ship's Surgeon on one of the Canadian steamship line's boats.

Deaths

Dr. Butler Ormond Lewis, Wacissa, aged 78, died February 17 as the result of a fractured hip.

Dr. Roscoe Conkling Hubbard, Tampa, aged 48, died March 24 of cerebral embolism and gangrene of the left leg.

Dr. James Peter Quirk, Perry, aged 65, died April 6 of heart disease.

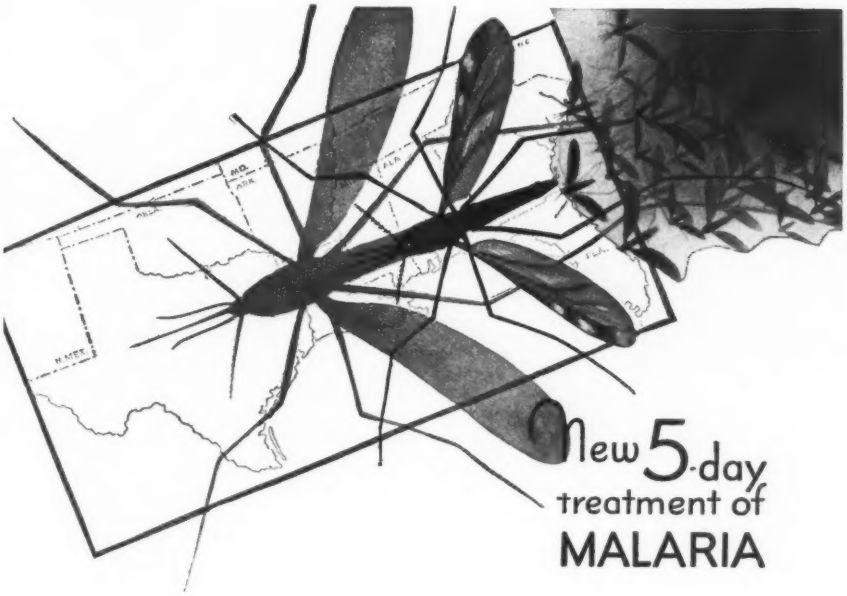
Dr. Robert Francis McLeod, Titusville, aged 40, died March 27 of acute dilatation of the heart.

Dr. H. Mercer Richards, Lakeland, aged 53, died April 6.

GEORGIA

Dr. Roy R. Kracke, Professor of Pathology, Emory University School of Medicine, Atlanta, was awarded the Ward Burdick Research Medal by the American Society of Clinical Pathologists,

Continued on page 16



Hitherto: THREE WEEKS' treatment with quinine has been commonly required to eradicate all parasites from the blood of the malarial patient.

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Atabrine has none of the by-effects of quinine which so often interrupt treatment and interfere with the patient's occupation. Relapses are much less likely to occur.

Moreover, Atabrine is economical as only five days' medication is usually necessary in tertian and quartan malaria.

DOSAGE: Adults, one tablet three times daily for 5 successive days. Children, one-half to one tablet, once to thrice daily according to age.

Pamphlet containing detailed instructions will be sent to physicians on request.

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WINTHROP

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Continued from page 666

at their recent annual meeting, for research work establishing certain types of drugs as etiological factors in agranulocytosis, the award being made by the organization at occasional intervals. Dr. Kracke's exhibit on the same subject at the recent annual meeting of the American Medical Association was awarded a Certificate of Merit.

The Georgia Urological Association held its meeting at Augusta in May. Officers for the coming year are: Dr. W. B. Emery, Atlanta, President; Dr. J. Righton Robertson, Augusta, President-Elect; and Dr. Major F. Fowler, Atlanta, Secretary-Treasurer.

Dr. Rudolph Bell has located at Thomasville with offices in the Upchurch Building after completing postgraduate work at the New York City Hospital.

Dr. Edgar G. Ballenger, Atlanta, was a guest speaker on the program of the recent meeting of the Western Urological Association at Los Angeles, California.

Dr. J. E. Penland and Dr. W. D. Mixson, Waycross, were hosts recently at dinner for members of the Ware County Medical Society.

Dr. William R. Houston, Augusta, recently addressed the Psychology Clinic at the University of Georgia at Athens.

Dr. L. W. Hodges, Gainesville, and Dr. W. C. Kennedy, Talmo, were hosts recently to members of the Hall County Medical Society.

Dr. and Mrs. A. J. Mooney, Statesboro, recently entertained at dinner members of the Bulloch-Candler-Evans Counties Medical Society and the Auxiliary.

Dr. Eugene R. Corson, Savannah, was honored with a banquet recently given him by the Georgia Medical Society in recognition of his research work and as one of the profession's most outstanding members.

The Baldwin County Medical Society has elected the following officers for the coming year: Dr. O. C. Woods, Milledgeville, President; Dr. Lucius Bailey, Hardwick, Vice-President; and Dr. R. E. Evans, Milledgeville, Secretary-Treasurer.

The Ben Hill County Medical Society has elected the following officers for the coming year: Dr. Charles Wilcox, President; Dr. E. J. Dorminy, Vice-President; and Dr. L. S. Osborne, Secretary-Treasurer; all of Fitzgerald.

The Dougherty County Medical Society has elected the following officers for the coming year: Dr. J. A. Redfearn, President; Dr. J. P. Tye, Vice-President; and Dr. H. M. McKemie, Secretary-Treasurer; all of Albany.

Dr. Shelley C. Davis and Miss Ethel York, both of Atlanta, were married May 26.

Deaths

Dr. Mary Eliza McKay, Macon, aged 75, died March 26 of cerebral hemorrhage.

Dr. Paul Lovejoy Holliday, Athens, aged 41, died April 22 of heart disease.

Dr. Peter E. Wilkin, Colquitt, aged 67, died February 27 of endocarditis.

Dr. Delvous Houseworth, Douglasville, aged 63, died April 17 of carcinoma of the pancreas.

Dr. Milton D. Striplin, Funston, aged 65, died February 9.

Dr. David W. Baggs, Ludowici, aged 63, died April 7.

KENTUCKY

Dr. John L. Jones, Louisville, was recently given a farewell dinner by members of the Board of Health and representatives of the local health departments and medical societies, the occasion being his resignation as Director of the Bureau of Epidemiology of the State Board of Health to become Assistant Health Officer of Utah, his native state.

Dr. Martin H. Jensen, formerly Assistant Director of the Bureau of County Health Work, has been appointed to succeed Dr. John L. Jones as Director of the Bureau of Epidemiology of the State Board of Health.

The University of Kentucky Medical Library has recently received several gifts of very old and rare volumes of medical works, one collection being presented by Ralph G. Edwards, a senior student, having belonged to physicians in his family; another collection having belonged to the late Dr. John W. Crenshaw, presented by his daughter; and a third collection presented by Dr. John C. Lewis, Lexington, son of the late Dr. John A. Lewis, Georgetown.

Continued on page 18

THE NEW YORK POLYCLINIC
MEDICAL SCHOOL AND HOSPITAL
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Obstetrics and Gynecology

A full time course. In Obstetrics: Lectures; prenatal clinics; witnessing normal and operative deliveries; operative obstetrics (manikin). In Gynecology: Lectures; touch clinics; witnessing operations; examination of patients pre-operatively; follow-up in wards post-operatively. Obstetrical and Gynecological pathology; regional anesthesia (cadaver). Attendance at conferences in Obstetrics and Gynecology.

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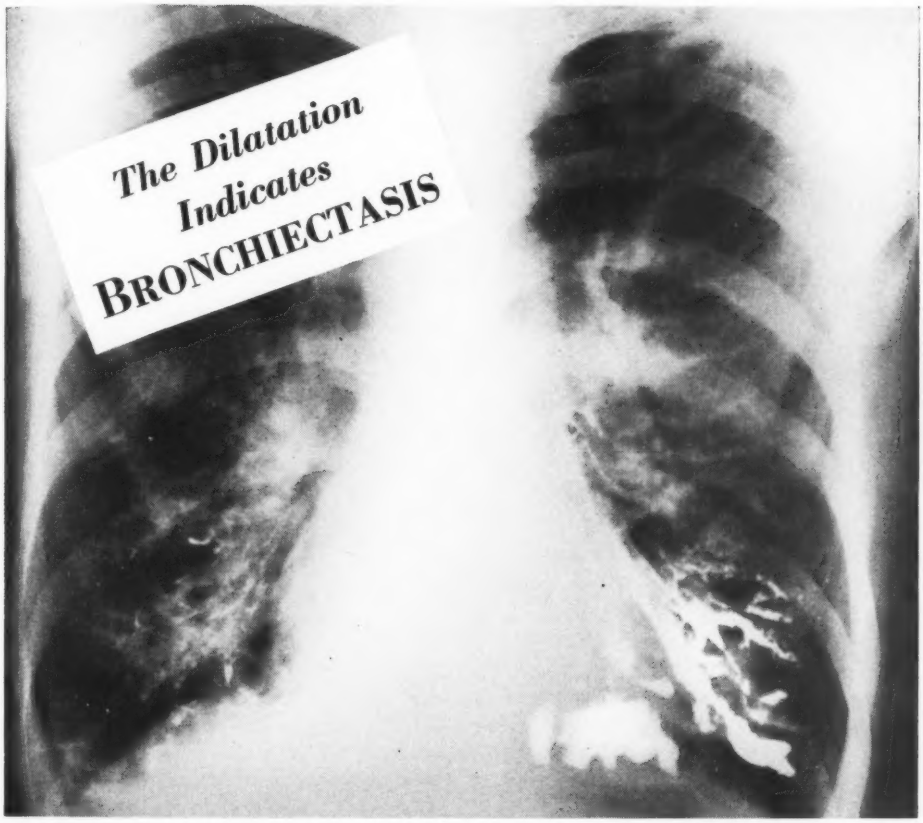

Radiograph showing extensive bronchial dilatation—bronchiectasis.

WITH only physical evidence bronchiectasis may be indistinguishable from pulmonary abscess. The symptoms and clinical course may be identical. Radiography, however, offers a positive means of differentiation.

Such cases should be referred to your radiologist. By radiographic examination, using a contrast medium, he can accurately localize the lesion and determine the size and contour of dilated bronchi if present—important to adequate drainage or surgery.

With this positive radiographic information in cases of bronchiectasis, correct treatment can be instituted . . . In addition, the course of disease can be followed.

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● *Mail the coupon below and we shall gladly send you regularly, "Radiography and Clinical Photography."*

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Continued from page 16

The Allen County Medical Society has elected the following officers for the coming year: Dr. C. A. Calvert, Scottsville, President; Dr. L. Graves, Scottsville, Vice-President; and Dr. A. O. Miller, Petroleum, Secretary-Treasurer.

The Caldwell County Medical Society has elected the following officers for the coming year: Dr. Kenneth L. Barnes, President; Dr. J. M. Moore, Princeton, Vice-President; and Dr. W. L. Cash, Princeton, reelected Secretary.

The Calloway County Medical Society has elected the following officers for the coming year: Dr. W. H. Mason, Murray, President; Dr. A. Y. Covington, Lexington, Vice-President; and Dr. A. F. Russell, Secretary and Treasurer.

The Garrard County Medical Society has elected the following officers for the coming year: Dr. W. M. Elliott, Lancaster, President; and Dr. B. Earl Caywood, Secretary-Treasurer.

The Laurel County Medical Society has elected the following officers for the coming year: Dr. H. V. Pennington, President; Dr. J. B. Mason, Vice-President; and Dr. O. D. Brock, Secretary-Treasurer; all of London.

The Livingston County Medical Society has elected the following officers for the coming year: Dr. John L. Hayden, Salem, President; and Dr. William C. Davis, Smithland, Secretary and Treasurer.

The McCracken County Medical Society has elected the following officers for the coming year: Dr. P. H. Stewart, President; Dr. Palmer H. Reed, Vice-President; Dr. E. W. Jackson, Treasurer; and Dr. Leon Higdon, Secretary; all of Paducah.

The Pulaski County Medical Society has elected the following officers for the coming year: Dr. T. M. Garner, Somerset, President; Dr. E. F. Beard, Somerset, Vice-President; and Dr. M. C. Spradlin, Secretary-Treasurer.

Deaths

Dr. Benjamin Franklin Van Meter, Lexington, aged 60, died March 8 of pulmonary tuberculosis.

Dr. George Francisco Simpson, Louisville, aged 74, died March 26 of bronchopneumonia.

Dr. Charles William White, Covington, aged 62, died March 13 of myocarditis.

Dr. Fordyce G. Gabbert, Casey Creek, aged 51, died March 16 of pneumonia and heart disease.

Dr. Charles Smoot Holton, Richmond, aged 73, died April 3 of heart disease.

Dr. Jesse K. Hayes, Hanson, aged 83, died March 9 of senility.

LOUISIANA

Dr. Foster M. Johns, New Orleans, was elected President of the American Society of Clinical Pathologists at its recent annual meeting at Cleveland.

The Louisiana State University Medical Center, New Orleans, recently had as visiting professor Dr. Chevalier Jackson, Professor of Bronchoscopy and Esophagoscopy, Temple University School of Medicine at Philadelphia, at which time Dr. Jackson gave a series of lectures.

Dr. C. C. Bass, Dr. Charles F. Craig and Dr. Ernest Carroll Faust, all of New Orleans, were recently made fellows in the American Academy of Tropical Medicine in recognition of their interest in and contributions to the advancement of tropical medicine.

Deaths

Dr. Samuel Aydelotte Billing, New Orleans, aged 57, died March 2.

MARYLAND

The Medical and Chirurgical Faculty of Maryland, at its recent annual meeting, elected the following officers for the coming year: Dr. John M. T. Finney, Baltimore, President; Dr. Louis Hamman, Baltimore, Dr. James McFaddin Dick, Salisbury, and Dr. Victor D. Miller, Hagerstown, Vice-Presidents; Dr. Walter

Continued on page 20

● Dressings and strappings on and about the face and head are neater and more durable when Drybak is used. Patients can wash with freedom, because water will not penetrate the back cloth and loosen the adhesive. The suntan color of Drybak is much less conspicuous—a feature patients appreciate. The surface of Drybak does not pick up or absorb dirt. Order Drybak from your dealer. It is available in standard widths and lengths in J & J cartridge spools and hospital spools, and in rolls, 5 yards x 12 inches, uncut.

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Neater—More Durable

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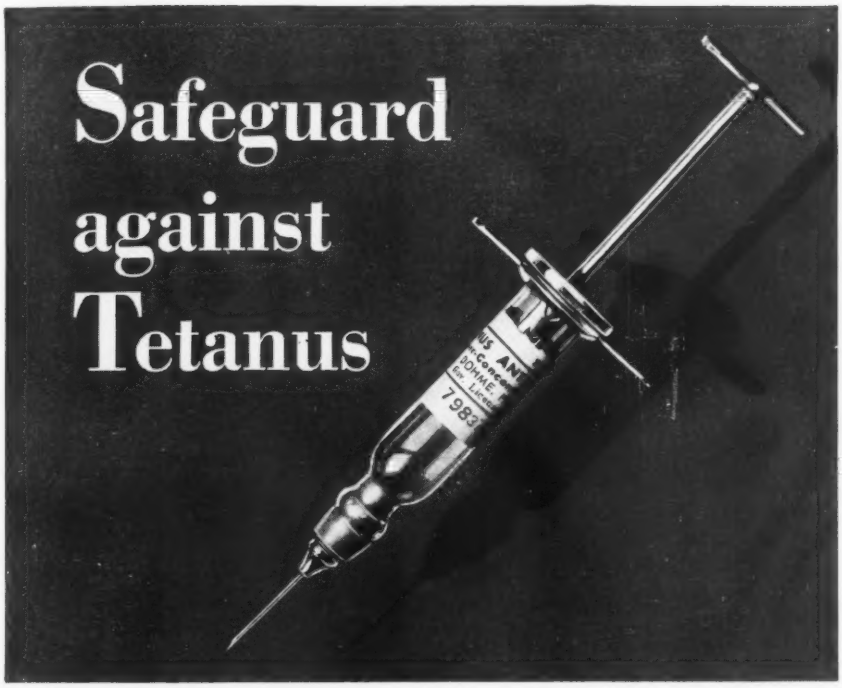


IN the emergency treatment of contused, lacerated and penetrating injuries, authorities agree on the immediate administration of 1,500 units of tetanus antitoxin as a safeguard against tetanus.

Because of its small volume and low protein content, Tetanus Antitoxin Super-Concentrated Mulford is well suited for this purpose. It is easily injected, is rapidly absorbed and produces almost immediate protection. The small volume and low protein content also reduce the incidence of local and systemic reactions.

When continuous protection is desired, repeated doses, as recommended by some authorities, may be administered at intervals of seven days.

Tetanus Antitoxin Super-Concentrated Mulford is aged and processed to yield a clear solution of stable potency. It is supplied in syringe containers, ready for prompt use, in packages of 1,500 units, 5,000 units, 10,000 units, 20,000 units.

MULFORD BIOLOGICAL LABORATORIES
Sharp & Dohme
PHILADELPHIA BALTIMORE

TETANUS ANTITOXIN
(Super-Concentrated Mulford)

Continued from page 18

D. Wise, Baltimore, reelected Secretary; and Dr. Charles Emil Brack, Baltimore, reelected Treasurer.

The Maryland Tuberculosis Association recently conducted special tuberculosis clinics for negroes as a feature of their observance of National Negro Health Week.

Dr. William H. F. Warthen, Baltimore, has been appointed to succeed Dr. John Frederick Hempel, deceased, as Assistant Commissioner of Health of the Baltimore City Health Department.

Dr. Joseph LeRoy Wright, Jessups, is the newly appointed Warden of the Maryland House of Correction, succeeding Dr. Joseph A. Delaney, deceased.

Dr. Henry S. Shelley, Baltimore, has been named to take Dr. Joseph LeRoy Wright's place as Physician-in-Charge of the Maryland House of Correction.

Dr. Humphrey Warren Buckler, Baltimore, has been named full-time Medical Health Officer for the City Health Department.

Dr. William K. Skilling, Baltimore, is the newly appointed Director of the Bureau of Child Welfare, succeeding Dr. William H. F. Warthen.

Dr. Howard Chandler Smith and Miss Mary Burnam, both of Baltimore, were married April 26.

DEATHS

Dr. John Richard Benton, Stevensville, aged 75, died March 19 of chronic nephritis and heart disease.

Dr. Peter Andrew Snell, Baltimore, aged 27, died March 14 of pneumonia.

Dr. Walter Benjamin Kirk, Darlington, aged 65, died February 21.

MISSISSIPPI

Dr. Theodore Austin, Greenwood, has been appointed First Resident Surgeon of the Rochester General Hospital, New York.

Dr. E. A. Trudeau, Biloxi, has been appointed County Editor of Harrison County.

Dr. M. J. Wolfe, Bay St. Louis, has been appointed County Editor for Hancock County.

Dr. E. W. W. Green, Wiggins, has been appointed County Editor for Stone County.

Dr. R. H. Clark, Hattiesburg, has been appointed County Editor for Forrest County.

Dr. and Mrs. A. W. Rhyne, Coahoma, recently entertained members of the Clarksdale and Six Counties Medical Society at a tea at their home.

The East Mississippi Medical Society held its banquet in April.

Dr. John K. Bullock, Jackson, and Miss Mary Lewise Mayers were married in April.

DEATHS

Dr. James O. Ringold, Winona, aged 60, died March 31 of arteriosclerosis.

Dr. West Montgomery Carson, Clarksdale, aged 62, died December 19.

Dr. Lawrence Boykin Hudson, Hattiesburg, aged 51, died April 18 from accidental shots while on a hunting trip.

Dr. Thomas Dowe Allen, Shaw, aged 57, died March 19 in a Greenville hospital.

Dr. Thomas Wright Reagan, Union, aged 49, died March 19.

Dr. Walter W. Holladay, Porterville, aged 77, died January 12 of myocarditis.

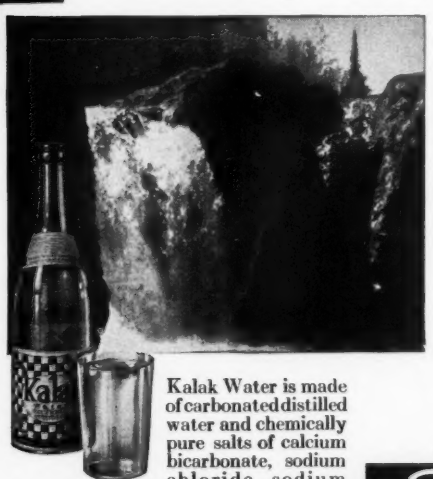
MISSOURI

The Missouri State Medical Association, at its annual meeting recently, elected the following officers for the coming year: Dr. E. Lee Miller, Kansas City, President-Elect; Dr. Dudley S.

Continued on page 22

A Pure, Palatable, Carbonated

PREPARED WATER



THERE are many conditions, no doubt, where you will want your patient to increase his daily intake of water.

In such cases, why not suggest the use of Kalak Water, the palatable, carbonated alkaline water prescribed by physicians for over twenty years.

Kalak Water is made of carbonated distilled water and chemically pure salts of calcium bicarbonate, sodium chloride, sodium phosphate and bicarbonates of magnesium, potassium and sodium.

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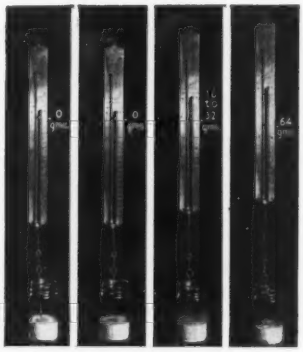
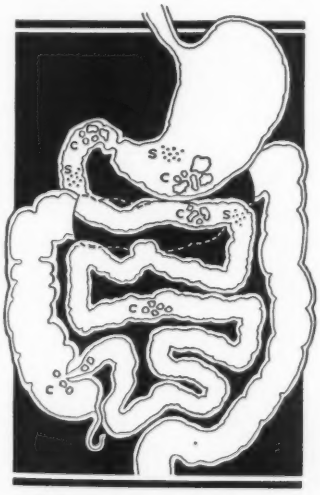


BREAST MILK | SIMILAC | POWDERED MILK | COW'S MILK



C—Cow's milk S—Similac
Schematic drawing of the relative size of the curds of cow's milk and Similac vomited by six weeks old puppies after one-half hour's ingestion.

"THE most available and the most easily digestible form of protein for infants is the protein of milk. The protein of breast milk is more digestible than that of cow's milk."

"In the light of our present knowledge, the chief cause of the difference in the digestibility of the protein of human milk and that of cow's milk lies in the greater proportion of casein in cow's milk."

"It is the formation of large curds which renders the casein of cow's milk so much more difficult of digestion by the infant than that of human milk. If the formation of large casein curds in the stomach can be prevented, the casein of cow's milk is easily digested." [1]

In SIMILAC the large casein curds are not formed. The curds formed when the gastric enzymes act upon SIMILAC are small and flocculent, registering zero on the tensiometer, as shown in the illustration, hence more easily digested.

The finer the curd the greater the surface area. The greater the surface area the more exposed are the fats, carbohydrates, proteins and salts to the digestive enzymes. Result . . . a more complete utilization of the food elements.

[1] Morse and Talbott, Diseases of Nutrition and Infant Feeding, pgs. 214, 215.

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SIMILAC—Made from fresh skim milk (casein modified); with added lactose, salts, milk fat and vegetable and cod liver oils.

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COLUMBUS, OHIO.

Continued from page 20

Conley, Columbia, Dr. Frank G. Mays, Washington, and Dr. Urban J. Busiek, Springfield, Vice-Presidents; and Dr. E. J. Goodwin, St. Louis, reelected Secretary-Editor.

The St. Louis Medical Society was host recently to the Board of Aldermen of the City of St. Louis.

The members of the Surgical and Medical Staff and the Executive Committee of the Barnes Hospital, St. Louis, attended the annual dinner given them at the hospital.

The Missouri Society for Mental Hygiene met in St. Louis in May for a two-day conference and annual meeting.

The Ophthalmic Section of the St. Louis Medical Society recently elected the following officers for the coming year: Dr. Roy E. Mason, President; Dr. John F. Hardesty, Vice-President; Dr. H. Noland Fisher, Secretary; and Dr. Otto M. Koenig, Treasurer; all of St. Louis.

The St. Louis County Organization for Crippled Children was recently formed for the purpose of aiding crippled children of St. Louis County. Dr. Archer O'Reilly, St. Louis, was named Chairman of the new organization.

St. Louis's city institutions for the care of the sick in the city recently held open house for the public in observance of annual National Hospital Day.

Deaths

Dr. David Nowlin, Montgomery City, aged 67, died March 5 in a St. Louis hospital of chronic nephritis, diabetes mellitus and gangrene of the right foot.

Dr. Kenneth Bowles Huffman, Joplin, aged 50, died March 12 of angina pectoris.

Dr. Ernest Jonas, St. Louis, aged 61, died March 2.

Dr. William A. Clark, Jefferson City, aged 68, died April 11 of pneumonia.

Dr. Stephen L. White, Seymour, aged 73, died March 13 of hypertrophy of the prostate and pyelonephritis.

Dr. Whitley Gray Hendrix, New London, aged 91, died in March.

Dr. Harold Hartley Greene, Jefferson City, aged 30, died April 9 of mastoiditis.

Dr. John H. Thompson, Kansas City, aged 82, died April 7 of angina pectoris.

NORTH CAROLINA

The North Carolina Alumni of the Medical College of Virginia had a dinner meeting during the annual meeting of the North Carolina State Medical Association and elected the following officers for the coming year: Dr. G. G. Dixon, Ayden, President; and Dr. J. M. Northington, Charlotte, Secretary.

Dr. Ovid C. Foote, formerly of Wilkes County, is the newly elected President of the North Carolina Society of Washington.

Deaths

Dr. William Edwards, Spring Hope, aged 69, died February 14 of cerebral hemorrhage and arteriosclerosis.

Dr. Eddie Timothy Hollingsworth, Goldsboro, aged 46, died May 7 of angina pectoris.

Dr. P. G. Pritchett, Roxboro, aged 87, died April 11.

Dr. W. A. Kirksey, Hope Mills, aged 45, died suddenly May 1.

Dr. Elisha W. Lister, Elizabeth City, aged 62, died May 1.

OKLAHOMA

Dr. J. W. McClendon, Earlsboro, is the newly appointed Medical Superintendent of the State Hospital at Supply, succeeding Dr. Thomas H. Berry.

Dr. T. A. Hill, Watonga, has been appointed to succeed Dr. W. F. Griffin as Secretary of the Blaine County Medical Society.

Dr. J. M. Allgood, formerly of Gould, has moved to Altus.

Deaths

Dr. Perry Gabriel Dunlap, Lawton, aged 75, died January 21 of angina pectoris.

Dr. Ross Grosshart, Tulsa, aged 56, died April 15 of coronary occlusion.

SOUTH CAROLINA

Dr. Robert Boyd and Miss Grace Stacey, both of Clover, were married recently.

Continued on page 24

An Advance in Opiate Medication

Dilaudid

dihydromorphinone hydrochloride

Council Accepted

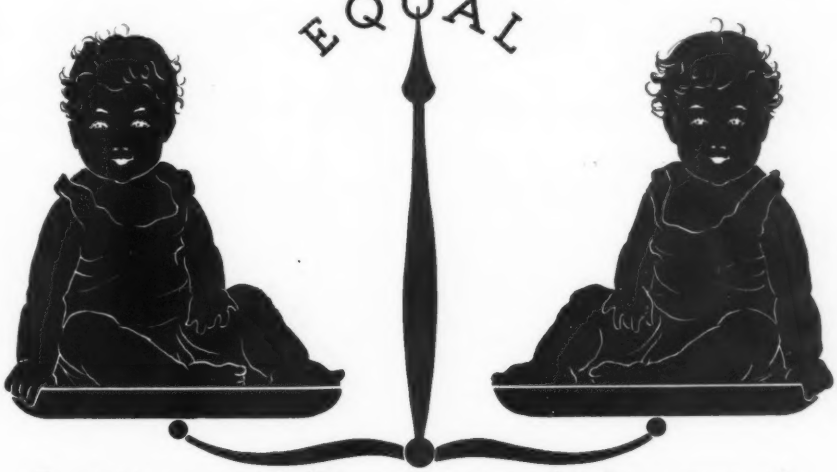
Dilaudid possesses several advantages over morphine for the control of pain and cough. It acts quicker, and causes fewer undesirable symptoms. A dose of 1/20 gr. Dilaudid will usually replace ¼ gr. morphine.

Hypodermic tablets, 1/32 and 1/20 grain.
Oral tablets, rectal suppositories, 1/24 grain.
Ampules, 1/32 grain. Powder, readily soluble.

Further information upon request. Send your Federal narcotic order for a trial tube of 20 hypodermic tablets 1/20 gr. each.

BILHUBER-KNOLL CORP., 154 Ogden Avenue, Jersey City, N. J.

THE SCALES MAY LIE!



Two babies may weigh alike . . . look equally healthy. BUT . . . the scales may lie! A child turgid with fat and water is *not* as healthy or as resistant to infection as the child with more *living*, firmer tissue.

DRYCO builds substantial babies. Twenty years of clinical reports have proven this. Its greater protein and mineral content tend towards optimum nutrition . . . particularly valuable in the stages of rapid growth. DRYCO's low (yet ample) fat content aids easy and rapid digestion and assimilation, even in cases where food concentration is necessary.

The Vitamins are practically unimpaired. Vitamin "D" is abundantly supplied to DRYCO by irradiation.

For results . . . for building vigorous babies with a minimum of infant complaints . . . prescribe DRYCO.

Case reports and samples on request.

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Made from superior quality milk from which part of the butterfat has been removed, irradiated by the ultra-violet ray, under license by the Wisconsin Alumni Research Foundation (U. S. Pat. No. 1,680,818) and then dried by the "Just" Roller Process.

THE DRY MILK COMPANY, INC.

DEPT. SM. 350 MADISON AVENUE, NEW YORK, N. Y.

A SAFE FOOD
for Summer Use
Horlick's —The— Original Malted Milk

Answers Many Problems of Hot Weather Diet:

1. A dependable, easily digested food for infant or growing child.
2. A nourishing food-drink for the nursing mother.
3. A beneficial table beverage in place of tea or coffee.
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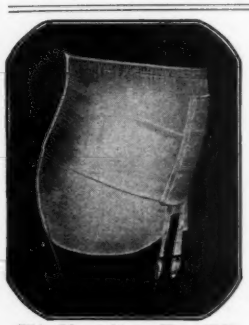
Binder and Abdominal Supporter



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STORM supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

Each Belt Made to Order **Ask for Literature**

KATHERINE L. STORM, M.D.
Originator, Owner and Maker
1701 Diamond St. **Philadelphia**

Continued from page 22

Dr. Archibald Johnston Buist, Charleston, and Miss Carolyn Elizabeth Murray were married April 3.

DEATHS

Dr. William M. Long, Liberty, aged 65, died March 19 of coronary thrombosis.

Dr. A. A. Horger, Harleyville, aged 62, died March 29 of heart disease.

Dr. James Maxwell Hobson, Belton, aged 53, died April 6.

Dr. R. E. Thompson, Inman, aged 84, died March 9 in a Spartanburg hospital of arterial hypertension and cerebral hemorrhage.

Dr. William Henry Johnson, Charleston, aged 64, died April 14.

TENNESSEE

The Tennessee State Medical Association, at its recent annual meeting, elected the following officers for the coming year: Dr. J. O. Manier, Nashville, President; Dr. W. B. Campbell, Cleveland, Vice-President for East Tennessee; Dr. J. K. Blackburn, Pulaski, Vice-President for Middle Tennessee; Dr. G. H. Berryhill, Jackson, Vice-President for West Tennessee; Dr. H. H. Shoulders, Nashville, reelected Secretary-Editor; and Dr. W. M. Hardy, Nashville, Assistant Secretary-Editor.

The recently appointed State Council of Public Health, appointed by the Governor for the purpose of cooperating in administration of the Health Department, has elected Dr. John M. Lee as President of the Council and Dr. O. A. Oliver as Vice-President; both of Nashville. The Council held their first meeting recently with Dr. E. L. Bishop, Commissioner of Health, and received information regarding Health Department activities.

The Tennessee Radiological Society, organized during the recent annual meeting of the State Medical Society, has elected the following officers for the coming year: Dr. C. M. Hamilton, Nashville, President; Dr. C. H. Heacock, Memphis, Vice-President; and Dr. Franklin B. Bogart, Chattanooga, Secretary-Treasurer.

Dr. R. O. Glenn has located at Mountain City to practice.

Dr. James Fred Terry, Cookeville, and Miss Margaret Katherine Harris were married recently.

DEATHS

Dr. John T. Smith, Georgetown, aged 65, died March 17.

Dr. Robert O. Huffaker, Greenville, aged 68, died April 19 of uremia, nephritis and myocarditis.

Dr. J. H. Litterer, Nashville, aged 42, died April 4.

TEXAS

The Texas State Hospital Association held its annual meeting at Temple recently and elected the following officers for the coming year: Dr. E. M. Collier, Abilene, President-Elect; Mrs. Martha P. Roberson, San Antonio, First Vice-President; C. E. Hunt, Lubbock, Second Vice-President; Mrs. Josie M. Roberts, Houston, Treasurer; Sister Stella, Fort Worth, Trustee; and Miss Mae Smith, Dallas, Secretary. The incoming President is Bryce L. Twitty, Dallas, Superintendent of Baylor Hospital.

The Northwest Texas Clinic and Hospital Managers' Association held its annual meeting in Temple recently.

The Harris County Medical Society recently had a dinner in Houston in honor of members of the Society over 70 years of age. Guests of honor were Dr. J. M. Blair, Dr. A. J. James, Dr. R. W. Knox, Dr. S. C. Red, Dr. C. U. Patterson, Dr. E. N. Gray, Dr. J. W. Scott, Dr. J. C. Johnson, and Dr. F. B. King. Dr. Judson L. Taylor, President of the Society, introduced the toastmaster, Dr. J. Harolde Turner. Dr. Marvin Lee Graves was the principal speaker.

Dr. George C. Kindly, Dallas, has been appointed to succeed Dr. A. W. Nash, deceased, as a member of the Dallas City-County Hospital Board.

Dr. May Owens, Fort Worth, is studying forensic medicine in a postgraduate course in New York City.

Dr. Joe Thorne Gilbert, Austin, and Miss Ailine Burch were married April 12.

Dr. E. B. Buchanan has moved from Albany to Olney.

Dr. George H. Garrett has moved from Del Rio to Glen Rose.

Dr. H. D. Giddings has moved from Boling to New Gulf.

Dr. John P. Howser has moved from Dallas to St. Louis, Missouri.

Dr. John Sealy Peek has moved from Galveston to Brownsville.

Continued on page 26

Klim message of the month

Your Own Klim Formula *for* Every Baby's Individual Needs

Every baby is a special feeding PROBLEM and, this being true, every baby must be fed in accordance with its individual needs. The reason that the average well baby gets along on an artificial food is not because of the food, but because of the wide limits of the tolerance of the well baby. With KLIM WHOLE POWDERED MILK FORMULAS you can adapt the formula both to the strong as well as to the feeble infant. KLIM is always fresh, ready for use, easily digested and assimilated and *requires no refrigeration — most important during the hot days of July and August.*

AUTHORITY: "We should not lose sight of the fact that one baby may thrive on a certain food which might be detrimental to another baby. No one particular formula appears to be well tolerated by every infant. The old adage, 'one man's food is another man's poison,' applies more forcibly in the case of the infant than of the adult. . . . We all know that cow's milk is a staple article of food in practically every home. It is inexpensive and easily available. No baby food product, regardless of its so-called superior qualities can replace it in economy and availability . . . . Patented baby foods are expensive luxuries in the average American home, and most of them have no greater virtue than properly controlled modifications of cow's milk. . . ." (Scobey, R. H.—"THE IMPORTANCE OF INFANT FEEDING TO THE GENERAL PRACTITIONER"—*Arch. Pediat.*, Vol. L, No. 2, Feb., 1933.)

PRESCRIBE

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Continued from page 24

Dr. Marvin L. Saddoris has moved from Canyon to Pawhuska, Oklahoma.

Dr. Allen Clay Gwinn, Jr., and Miss Mary Virginia Homan, both of El Paso, were married April 25.

DEATHS

Dr. Weston Columbus Sumner, Ganado, aged 57, died March 30 of chronic granular nephritis.

Dr. Jim M. Hart, Fort Worth, aged 77, died March 27 of bronchopneumonia and heart disease.

Dr. Albert Ware Nash, Dallas, aged 50, died March 11 of coronary thrombosis.

Dr. Marvin Rives, Houston, aged 58, died March 27 of acute dilatation of the heart.

Dr. Edwin Daniel Townsend, Eastland, aged 72, died March 20 of cerebral hemorrhage.

Dr. John B. Deal, Crockett, aged 46, died March 2.

Dr. Alexander Hayden Lindsay, Amarillo, aged 73, died March 25.

VIRGINIA

The Virginia Society of Ophthalmology and Otolaryngology met at Lynchburg in May and elected the following officers for the coming year: Dr. B. R. Kennon, Norfolk, President; Dr. E. W. Burton, University, Vice-President; and Dr. G. G. Hankins, Newport News, Secretary-Treasurer.

The Alleghany-Bath County Medical Society has elected the following officers for the coming year: Dr. S. P. Hileman, Millboro, President; and Dr. R. P. Hawkins, Jr., Clifton Forge, Secretary.

The Danville-Pittsylvania County Medical Society has elected the following officers for the coming year: Dr. S. E. Hughes, President; and Dr. P. W. Miles, Secretary; both of Danville.

The South Piedmont Medical Society met at South Boston recently and elected the following officers for the coming year: Dr. George A. Stover, South Boston, President; Dr. C. D. Barksdale, Sutherlin, Dr. C. D. Bennett, Chatham, Dr. H. H. Hurt,

Continued on page 28

SCANTY, painful or irregular menstruation usually results in fixed, faulty physiological habits. Treatment is more successful if instituted early.

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For samples simply attach this line to your letterhead

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Continued from page 26

Lynchburg, and Dr. L. H. Hoover, Clarksville, Vice-Presidents; and Dr. John A. Owen, Turbeville, Secretary-Treasurer.

Dr. Hunter H. McGuire, Winchester, has been reelected President of the Winchester Memorial Hospital, and Dr. James A. Miller has been elected Secretary, succeeding Dr. J. E. Harris, resigned.

The Virginia State Department of Health recently sponsored special conferences for county health officers which were held in the Health Department offices at Richmond.

Dr. D. Edward Watkins has located at Waynesboro and become associated with Dr. B. K. Weems in the practice of medicine and surgery.

The Mecklenburg County Medical Society held a supper meeting at Clarksville in May.

The Post-Graduate Medical Society held a clinical meeting in May at the Southside Hospital at Farmville.

The Ella Oliver Home

A private maternity home for the care and protection of unfortunate girls during pregnancy and confinement.

Under auspices of Women's Christian Association of this city.

Staff physician in daily attendance or may have any other ethical physician. Modern hospital equipment, graduate nurse. Rates very reasonable. Adoption or board arranged for babies.

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Dr. J. Stuart Staley has located at Marion for the practice of medicine.

Dr. K. T. Redfield, formerly Superintendent of Jefferson Hospital, Roanoke, has been appointed to succeed Dr. James H. Culpepper, deceased, as Superintendent of Protestant Hospital, Norfolk.

Dr. A. H. Deekens, Richmond, is the newly elected President of the Virginia Chapter, Alumni of the University of Pennsylvania.

Dr. George W. Skaggs, formerly of Page, West Virginia, has moved to Dublin, where he will locate for practice, having taken over the practice of Dr. D. B. Stuart, who has moved to Roanoke.

Dr. David B. Stuart, recently of Pulaski, has located at Roanoke with offices in the MacBain Building.

Dr. E. G. Brumback, Luray, has been elected Vice-President of the First National Bank. He has been a member of the Board of Directors for about twenty-five years.

The Jefferson Hospital, Roanoke, has chosen as the new Superintendent, succeeding Dr. K. T. Redfield, Mr. C. B. Short.

Dr. L. Floyd Hobbs has located at Jewell Ridge for general practice.

Dr. Douglas VanderHoof, Richmond, has been elected President of the Dartmouth College Alumni Association in Richmond.

The Bedford County Medical Society has reorganized and elected as officers for the coming year: Dr. C. H. Bondurant, President; and Dr. J. A. Rucker, Secretary-Treasurer; both of Bedford.

Dr. Henry C. Davis, Williamsburg, has been elected the new member of the City School Board.

Dr. William Reese, Petersburg, was recently elected Exalted Ruler of the Petersburg Elks Lodge.

Dr. Charles Outland, Richmond, has been elected a member of the Board of Directors of the Richmond Rotary Club.

Dr. B. B. Dutton, Winchester, is the newly elected Vice-President of the Winchester Rotary Club.

Dr. Harry Lee Denoon, Jr., Nassawadox, and Miss Clara West Holland were married in May.

Dr. Otway Kyle Burnette and Mrs. Elizabeth George Haenny, both of Culpepper, were married in May.

Dr. Marion Bagley Walker, Norfolk, and Miss Janet Rankin Tucker were married in April.

Dr. Dudley Curtis Ashton and Miss Myrtle Irene Cooper, both of Richmond, were married in April.

Deaths

Dr. William W. Buck, Rural Retreat, aged 77, died March 25 of heart disease and nephritis.

Dr. George Paul LaRoque, Richmond, aged 57, died suddenly May 16.

Dr. William Francis Cooper, Newport News, aged 78, died May 20.

Dr. John Marsham Ropp, Roanoke, aged 67, died April 29 as the result of injuries received in an automobile accident.

Dr. Thomas Scott Hening, Maidens, aged 61, died April 29.

WEST VIRGINIA

The West Virginia State Medical Association, at its recent annual meeting at Huntington, elected the following officers for the coming year: Dr. Rome H. Walker, Charleston, President; Dr. William W. Strange, Huntington, and Dr. Robert C. Hood, Clarksburg, Vice-Presidents; Dr. Thomas M. Barber, Charleston, Treasurer; and Mr. Joe W. Savage, Charleston, reelected Secretary.

Dr. Dudley Curtis Ashton, formerly of Richmond, Virginia, has moved to Beckley, where he will practice medicine.

Dr. William F. Hatcher, formerly of Bath County, Virginia, has moved to McDowell to practice.

Dr. George W. Skaggs has moved from Page to Dublin, Virginia.

Deaths

Dr. Wilkin Blackburn Stevens, Kimball, aged 56, died March 8 of coronary occlusion.

Dr. Oakley Stitt Gribble, Clarksburg, aged 57, died April 3 of carcinoma of the prostate with metastasis.

Dr. Walter Milton Babb, Keyser, aged 63, died March 25.

Dr. James E. Cooper, Cameron, aged 59, died April 15 of injuries received when the car he was driving was struck by a train.

Dr. William Edward Cook, Pageton, aged 63, died May 5 of chronic myocarditis.

Dr. Peter D. Arbogast, Morgantown, aged 68, died March 31.

Summer Diarrhea

A Rational Procedure

The following formula provides a means of supplying fuel for heat and energy and furnishes immediately available nutrition to protect body proteins, to prevent rapid loss of weight, to resist the activity of putrefactive bacteria, and to favor the retention of body fluids and salts.

Mellin's Food . . 4 level tablespoonfuls
***Water** {boiled, then cooled} 16 fluidounces*

(Maltose and dextrins 4.5%, proteins .5%, salts .25%
Alkaline in reaction. pH 7.55)

The usual practice is to give one to three ounces every hour or two until stools lessen in number and improve in character.

The mixture is then gradually strengthened by substituting one ounce of skimmed milk for one ounce of water, until the amount of skimmed milk is equal to the quantity of milk usually employed in normal conditions.

Finally the fat is gradually replaced by skimming less and less cream from the milk.

Samples and literature sent to physicians upon request.

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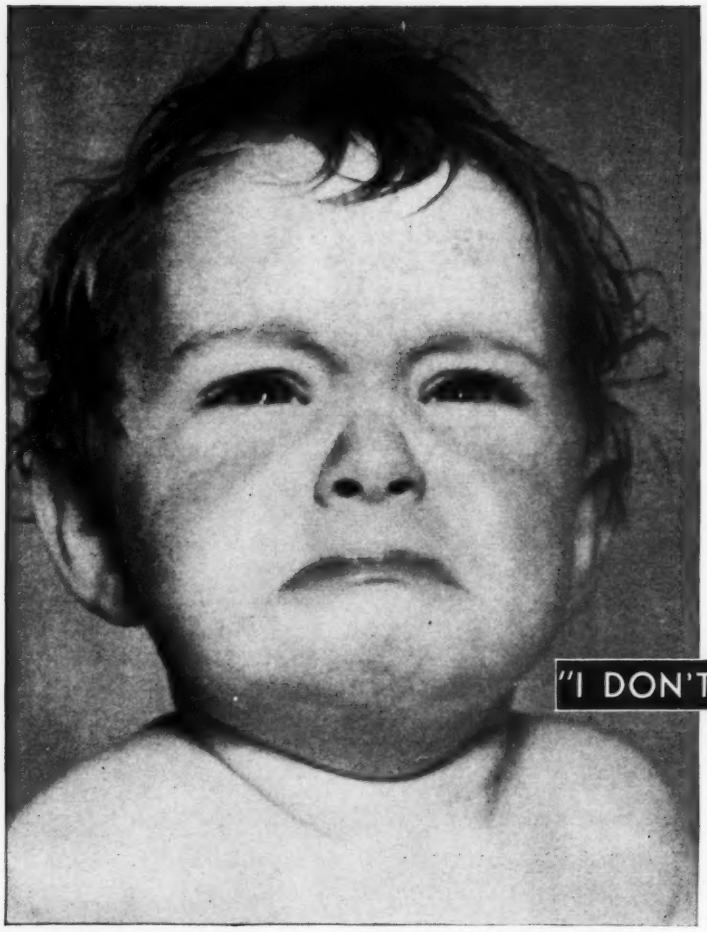
Directions for using Mellin's Food are left entirely to the physician.



"I DON'T LIKE SPINACH!"

It takes more severity than many mothers can command to force spinach upon a tearful child. Yet careful menu-planning is needed to make up the 12 mg. of iron required daily. Leichsenring and Flor, as an example, found that children's diets planned to contain 5 and 8.5 mg. iron actually supplied only 3.25 and 6.5 mg., respectively, although the diet was designed to provide a high iron intake and included such foods as raisins, carrots, graham bread, prunes, lettuce, beef, and egg.[4]

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PABLUM is a food that children really like and take willingly. Added to this virtue, it supplies *known* amounts of iron—more than any other food of equal caloric value! This unique pre-cooked cereal contains 566% more iron than fresh spinach with an iron content of 3.6 mg.[2] (The U. S. Dept. of Agriculture reports an even lower average for spinach—2.5 mg.[3]) When included in the child's daily diet from the third month on, Pablum is a valuable prophylactic against nutritional anemia. Besides the hemoglobin-building element, iron, Pablum contains copper and substantial amounts of calcium, phosphorus, and vitamins A, B, E, and G. Abundant, too, in calories, proteins, fat, and carbohydrates.

1-3 *Bibliography on request.*

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Pablum consists of wheatmeal, oatmeal, cornmeal, wheat embryo, yeast, alfalfa leaf and beef bone. Supplies vitamins A, B, E, and G and calcium, phosphorus, iron, copper, and other essential minerals.

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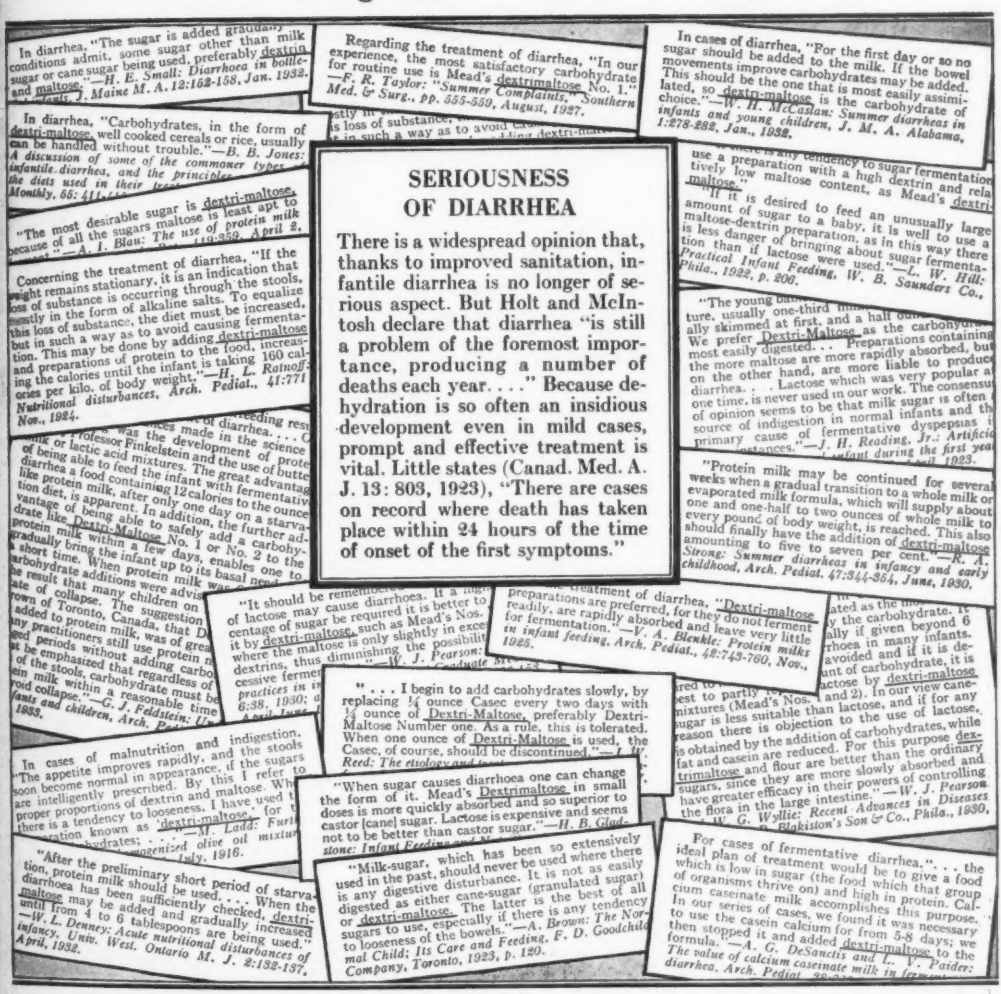
DIARRHEA

"the commonest ailment of infants in the summer months"

(HOLT AND McINTOSH: HOLT'S DISEASES OF INFANCY AND CHILDHOOD, 1933)

One of the outstanding features of DEXTRI-MALTOSE is that it is almost unanimously preferred as the carbohydrate in the management of infantile diarrhea.


In diarrhea, "The sugar is added gradually, conditions admit, some sugar other than milk sugar or cane sugar being used, preferably dextrin and maltose."—H. E. Small: Diarrhoea in bottle-fed infants, J. Maine M. A. 12:152-158, Jan. 1932.
Regarding the treatment of diarrhea, "In our experience, the most satisfactory carbohydrate for routine use is Mead's dextrimaltose No. 1."—F. R. Taylor: "Summer Complaints," Southern Med. & Surg., pp. 555-559, August, 1927.
In cases of diarrhea, "For the first day or so no sugar should be added to the milk. If the bowel movements improve carbohydrates may be added. This should be the one that is most easily assimilated, so dextri-maltose is the carbohydrate of choice."—W. H. McCaslan: Summer diarrheas in infants and young children, J. M. A. Alabama, 1:278-282, Jan., 1932.
In diarrhea, "Carbohydrates, in the form of dextri-maltose, well cooked cereals or rice, usually can be handled without trouble."—B. B. Jones: A discussion of some of the commoner types of infantile diarrhea, and the principles underlying the diets used in their treatment, Monthly, 55: 411-[illegible]
SERIOUSNESS OF DIARRHEA
There is a widespread opinion that, thanks to improved sanitation, infantile diarrhea is no longer of serious aspect. But Holt and McIntosh declare that diarrhea "is still a problem of the foremost importance, producing a number of deaths each year. . . ." Because dehydration is so often an insidious development even in mild cases, prompt and effective treatment is vital. Little states (Canad. Med. A. J. 13: 803, 1923), "There are cases on record where death has taken place within 24 hours of the time of onset of the first symptoms."
"The most desirable sugar is dextri-maltose, because of all the sugars maltose is least apt to [illegible]—A. I. Blau: The use of protein milk [illegible] 119:359, April 2,
Concerning the treatment of diarrhea, "If the weight remains stationary, it is an indication that loss of substance is occurring through the stools, mostly in the form of alkaline salts. To equalize this loss of substance, the diet must be increased, but in such a way as to avoid causing fermentation. This may be done by adding dextri-maltose and preparations of protein to the food, increasing the calories until the infant is taking 160 calories per kilo. of body weight."—H. L. Ratnoff: Nutritional disturbances, Arch. Pediat., 41:771 Nov., 1924.
use a preparation with a high dextrin and relatively low maltose content, as Mead's dextri-maltose."
"If it is desired to feed an unusually large amount of sugar to a baby, it is well to use a maltose-dextrin preparation, as in this way there is less danger of bringing about sugar fermentation than if lactose were used."—L. W. Hill: Practical Infant Feeding, W. B. Saunders Co., Phila., 1922, p. 206.
"The young [illegible] ture, usually one-third [illegible] ally skimmed at first, and a half [illegible] We prefer Dextri-Maltose as the carbohydrate most easily digested. . . Preparations containing the more maltose are more rapidly absorbed, but on the other hand, are more liable to produce diarrhea. . . Lactose which was very popular at one time, is never used in our work. The consensus of opinion seems to be that milk sugar is often a primary cause of fermentative dyspepsias in [illegible] stances."—J. H. Reading, Jr.: Artificial [illegible] infant during the first year [illegible] April, 1923.
"Protein milk may be continued for several weeks when a gradual transition to a whole milk or evaporated milk formula, which will supply about one and one-half to two ounces of whole milk to every pound of body weight, is reached. This also should finally have the addition of dextri-maltose amounting to five to seven per cent."—K. A. Strong: Summer diarrheas in infancy and early childhood, Arch. Pediat. 47:344-364, June, 1930.
"It should be remembered that the [illegible] of lactose may cause diarrhoea. If a milk [illegible] centage of sugar be required it is better to [illegible] it by dextri-maltose, such as Mead's Nos. [illegible] where the maltose is only slightly in excess [illegible] dextrins, thus diminishing the possibility [illegible] cessive fermentation."—W. J. Pearson: [illegible] practices in [illegible] 6:38, 1930; [illegible] April, [illegible]
[illegible] preparations are preferred, for they do not ferment readily, are rapidly absorbed and leave very little for fermentation."—V. A. Blenkle: Protein milks in infant feeding, Arch. Pediat., 42:745-760, Nov., 1925.
[illegible] treatment of diarrhea, "Dextri-maltose [illegible] ated as the [illegible] y the carbohydrate. It [illegible] ally if given beyond 6 [illegible] rhoea in many infants. [illegible] avoided and if it is de- [illegible] ant of carbohydrate, it is [illegible] lactose by dextri-maltose. [illegible] est to partly [illegible] Nos. 1 and 2). In our view cane- [illegible] mixtures (Mead's Nos. 1 and 2). In our view cane-sugar is less suitable than lactose, and if for any reason there is objection to the use of lactose, is obtained by the addition of carbohydrates, while fat and casein are reduced. For this purpose dextri-maltose and flour are better than the ordinary sugars, since they are more slowly absorbed and have greater efficacy in their powers of controlling the flora in the large intestine."—W. J. Pearson: [illegible] W. G. Wyllie: Recent Advances in Diseases [illegible] Blakiston's Son & Co., Phila., 1930,
"When sugar causes diarrhoea one can change the form of it. Mead's Dextrimaltose in small doses is more quickly absorbed and so superior to castor [cane] sugar. Lactose is expensive and seems not to be better than castor sugar."—H. B. Gladstone: Infant Feeding [illegible]
"Milk-sugar, which has been so extensively used in the past, should never be used where there is any digestive disturbance. It is not as easily digested as either cane-sugar (granulated sugar) or dextri-maltose. The latter is the best of all sugars to use, especially if there is any tendency to looseness of the bowels."—A. Brown: The Normal Child; Its Care and Feeding, F. D. Goodchild Company, Toronto, 1923, p. 120.
. . . I begin to add carbohydrates slowly, by replacing ¼ ounce Casec every two days with ¼ ounce of Dextri-Maltose, preferably Dextri-Maltose Number one. As a rule, this is tolerated. When one ounce of Dextri-Maltose is used, the Casec, of course, should be discontinued."—J. W. Reed: The etiology and [illegible]
In cases of malnutrition and indigestion, "The appetite improves rapidly, and the stools soon become normal in appearance, if the sugars are intelligently prescribed. By this I refer to proper proportions of dextrin and maltose. Where there is a tendency to looseness, I have used to any practitioners still use protein m ged periods without adding carbo at be emphasized that regardless of of the stools, carbohydrate must be en milk within a reasonable time roid collapse."—G. J. Feddstein: [illegible] fants and children, Arch. Pedi 1930.
"After the preliminary short period of starvation, protein milk should be used. . . . When the diarrhoea has been sufficiently checked, dextri-maltose may be added and gradually increased until from 4 to 6 tablespoons are being used."—W. L. Denney: Acute nutritional disturbances of infancy, Univ. West. Ontario M. J. 2:132-137, April, 1932.
For cases of fermentative diarrhea, ". . . the ideal plan of treatment would be to give a food which is low in sugar (the food which that group of organisms thrive on) and high in protein. Calcium caseinate milk accomplishes this purpose. In our series of cases, we found it was necessary to use the casein calcium for from 5-8 days; we then stopped it and added dextri-maltose to the formula."—A. G. DeSanctis and L. V. Paider: The value of calcium caseinate milk in [illegible] diarrhea, Arch. Pediat. [illegible]

Just as DEXTRI-MALTOSE is a *carbohydrate* modifier of choice, so is CASEC (calcium caseinate) an accepted *protein* modifier. Casec is of special value during the summer months (1) for colic and loose green stools in breast-fed infants; (2) in fermentative diarrhea in bottle-fed infants, (3) as a prophylactic against diarrhea in infections.

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There is little of the spectacular about this work—little to make headlines in your daily newspaper. But as laboratory workers probe relentlessly, and as laboratory lamps burn far into the night, fresh clues are being unearthed. Patiently, these bits of evidence are being pieced together. Steadily the store of medical knowledge on cancer is being enriched.

The goal the whole world hopes for has not yet been reached. But important progress *has* been made. Today, cancer is *not* hopeless. Today, many forms of cancer *can* be cured.

But each of these statements is true only when qualified with a very important "IF"—that is, *if* the case is put into the hands of a trained physician in its early stages. As insignificant a period as one month can assume the importance of eternity—a cancer that might be cured today, may be beyond help in a single month.

How can one detect its early stages? The symptoms are so variable that it's futile, as well as dangerous, for the layman even to attempt an accurate diagnosis. But there are warnings, of which these are outstanding: a lump that won't go down . . . a sore that won't heal . . . persistent bleeding or any other persistent unnatural discharge from any part of the body . . . persistent unexplained indigestion.

These symptoms do not necessarily mean cancer. But they're reason for suspicion; and reason, therefore, to see your doctor immediately. If it *is* cancer, the tumor can, in many cases, be *completely removed* by surgery. In many others, it can be controlled by the proper use of x-ray or radium.

And if it *isn't* cancer, the relief that comes with banished fears and worries, will be a rich reward for doing the wise thing—for seeing your doctor when you first suspect that something may be wrong.

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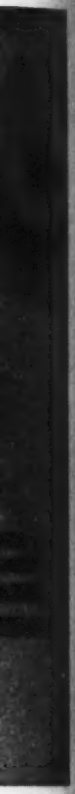

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